

UNITED STATES FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ACTION STATEMENT

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the action of implementing a Habitat Management Program on Pond Creek NWR commensurate with meeting the refuge's biological objectives.

_____ is a categorical exclusion as provided by 516 DM 2, Appendix 1 and 516 DM6 Appendix 1. No further NEPA documentation will therefore be made.

XX is found not to have significant environmental effects as determined by the attached environmental assessment and finding of no significant impact.

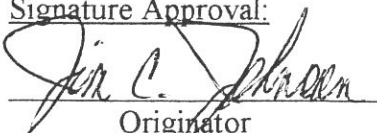
_____ is found to have significant effects and, therefore, further consideration of this action will require a notice of intent to be published in the Federal Register announcing the decision to prepare an EIS.

_____ is not approved because of unacceptable environmental damage, or violation of Fish and Wildlife Service mandates, policy, regulations, or procedures.

_____ is an emergency action within the context of 40 CFR 1506.11. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents: Pond Creek NWR Comprehensive Conservation Plan and Environmental Assessment; Pond Creek NWR Visitors Services Plan and Environmental Assessment; Pond Creek NWR Hunt Plan, Pond Creek NWR Habitat Management Plan and Environmental Assessment.

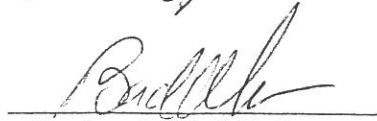
Signature Approval:


Originator

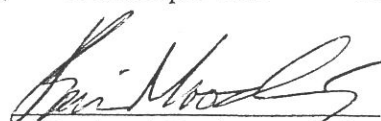
9/19/03
Date


Area Supervisor

8/21/03
Date


Regional Chief, Refuges

10/30/03
Date


Regional Environmental
Coordinator

8/26/2003
Date

for 
Regional Director

11/3/03
Date

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS ¹
American bald eagle	T
Ouachita rock pocketbook mussel	E
pink mucket pearly mussel	E
pondberry	E
American alligator	T (s/a)
leopard darter	T
American burying beetle	E

¹STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attach map):

A. Ecoregion Number and Name: Number 15, Arkansas/Red

B. County and State: Sevier, County, Arkansas

C. Section, township, and range (or latitude and longitude): Portions of
T10S R30, 31 & 32 W
T11S R29, 30 & 31 W

D. Distance (miles) and direction to nearest town: One mile NE

E. Species/habitat occurrence:. See map.

Based on available information from the literature and from Arkansas Game and Fish Commission/U.S. Fish and Wildlife Service Biologists, no threatened or endangered species other than the bald eagle and pondberry, has been documented on the Pond Creek Project area. The leopard darter has been documented in the Cossetot River north of the project area, near Gillham Lake. There is a possibility of the Ouachita rock pocket book mussel and the pink mucket pearly mussel being in the Little River system.

January, 1999

Bald eagles are an occasional visitor to the area during the winter as they follow migrating waterfowl. Pondberry (endangered) is likely present in one large permanently wet depressional area located on the west side of the refuge. Historical ranges of the American burying beetle (endangered) and scaleshell (endangered) include this part of southwest Arkansas but the species have not been identified in the immediate area. The Ouachita rock pocketbook mussel has been found in the Little River and is considered to occur in the refuge. American alligator (Federally listed; threatened by similarity of appearance) is present in the lakes, sloughs, and streams of Pond Creek National Wildlife Refuge. The other species mentioned, pink mucket pearly mussel, if in fact present on the refuge, is an aquatic dweller and should not be affected by dry weather logging using streamside management zones (SMZ) and other best forest management practices.

VII. Determination of Effects:**A. Explanation of effects of the action on species and critical habitats in item V.
B (attach additional pages as needed):**

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
American bald eagle	No impact expected. Habitat will be protected. Nest
Ouachita rock pocketbook mussel *	surveys will be conducted during prescription cruises and
leopard darter *	"Habitat Management. Guidelines for the bald eagle in
pink mucket pearly mussel *	the Southeast Region" implemented if one is found.
American burying beetle	* No Impact expected. Dry weather logging
American alligator #	only; riparian buffers exist. Best Forest
pondberry #	Management Practices will be used in all
	activities; all known sites protected during
	silviculture activities.
	# No expected impact, no wetland areas will be
	entered during the lifetime of the document
	actions.

B. Explanation of actions to be implemented to reduce adverse effects:

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
American bald eagle	Perch sites will be protected along streambanks
Ouachita rock pocketbook mussel *	* Dry weather logging only; riparian buffers
leopard darter *	in place; Best Mgmt. Practices implemented.
pink mucket pearly mussel*	# Target area is outside permanent water
American alligator #	wetlands. Logging will not be in sites conducive
	to this species. Surveys for pondberry will be
pondberry #	completed. All depressional areas (e.g. potential
American burying beetle	habitat) will be protected by SMZ's.
	Soil disturbance will be kept to a minimum;
	recommend surveys by ES/Partner organizations
	be conducted to document presence/absence.

VIII. Effect Determination and Response Requested:


SPECIES/ CRITICAL HABITAT	DETERMINATION ¹			RESPONSE ¹ REQUESTED
	NE	NA	AA	
American bald eagle	X			Concurrence
Ouachita rock pocketbook mussel		X		Concurrence
leopard darter		X		Concurrence
pink mucket pearly mussel	X			Concurrence
American burying beetle		X		Concurrence
American alligator		X		Concurrence
pond berry		X		Concurrence

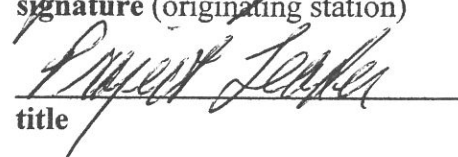
¹DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".


signature (originating station)


title


date

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence X Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

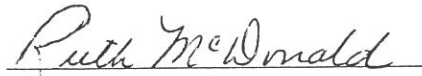
D. Informal conference required _____

E. Remarks (attach additional pages as needed):

<u>Ally M. Mullen</u>	<u>8/15/03</u>
signature	date
<u>Field Supervisor</u>	<u>Arkansas Field Office</u>
title	office

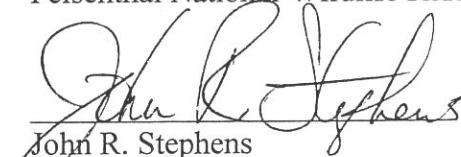
FOREST HABITAT MANAGEMENT PLAN
POND CREEK NATIONAL WILDLIFE REFUGE
LOCKESBURG, ARKANSAS

Prepared by:



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8/19/03
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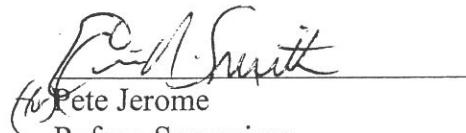
Submitted by:



Jim C. Johnson
Project Leader
South AR Refuges Complex, Crossett, AR

8/19/03
Date

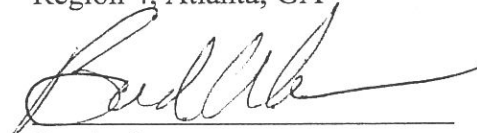
Concurrence by:



Pete Jerome
Refuge Supervisor
District 1, Division of Refuges
Region 4, Atlanta, GA

8/24/03
Date

Approved by:



Jon Andrews
Chief, Division of Refuges
Region 4, Atlanta, GA

10/30/03
Date

Pond Creek National Wildlife Refuge

Forest Habitat Management Plan

July 2003

Forest Habitat Management Plan

Compartment Summaries & Maps

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I. Introduction

A. Scope of Plan

This Forest Habitat Management Plan (FHMP) has been prepared for Pond Creek National Wildlife Refuge (NWR) in southwestern Arkansas. The purpose for the plan is to identify the forest habitat needs for the refuge and identify the management actions that will be implemented to achieve refuge wildlife objectives. The life span of the FHMP will be for the next 15 years (2003-2018).

II. Background

A. Inventory and description of refuge habitats

1. Baseline information:

Pond Creek NWR is located in Sevier County, Arkansas, approximately 55 miles north of the city of Texarkana and 142 miles southwest of Little Rock, the Arkansas state capital. It protects the largest remaining tract of bottomland hardwoods along the Little River, and extends west from U.S. Highway 71 almost to the Oklahoma state line. Pond Creek bisects the refuge and flows from the northwest to the southeast where it intersects the Cossatot River just upstream from the confluence of the Cossatot/Little Rivers.

This forested wetland has a relatively narrow topographic relief, with a difference of only 40 feet between the lowest point at the mouth of the Cossatot River (elevation 260 feet above mean sea level), and the furthest point seven miles upstream on Pond Creek. Although relatively flat, this topography is complex with numerous stream and river channels, small tributaries and depressions, old river meanders and oxbow lakes, multiple river terraces in various stages of erosion and decomposition, and adjacent poorly drained flats. The subtle but complex topography has a dramatic effect on the evolution of the biotic communities.

Pond Creek NWR consists of 26,292 acres of fee title ownership. The refuge administers public use activities on another 2,000 (+) acres through various easements but has no management authority on these properties. The refuge has been separated into eight (8) management units or compartments which range in size from 2,217 to 4,752 acres (see map pp 49). Compartment boundaries are established along geographic features that can be easily identified on the ground (i.e. streams, roads, trails, etc). Compartment evaluations will follow a 15-year cycle. The compartments were inventoried in 2000/2001 and further divided into stands. Table 1 (pp 2) and map (pp 48) provides existing land use by compartment on Pond Creek NWR.

Table 1. Area Summary Table, Pond Creek NWR

Compartment	Native Forest	Pine Plantation	Beaver Ponds	Perm. Water	R.O.W.¹	Roads	Total Acres
1	2,537	N/A	182	21	0	7	2,747
2	1,950	192	28	21	6	20	2,217
3	2,425	965	11	18	5	45	3,469
4	1,483	1,760	14	13	0	49	3,319
5	2,750	1,594	184	6	0	40	4,574
6	3,024	305	341	12	0	36	3,718
7	2,323	1,247	227	8	16	39	3,860
8	2,099	192	25	42	12	18	2,388
Total	18,591	6,255	1,012	141	39	254	26,292

The refuge is located in the humid subtropical zone. The climate is controlled by two principal air masses - warm, moist air from the Gulf of Mexico, which generally dominates in the spring and summer; and cooler, drier air from the Central Plains, which makes itself felt in winter (Stroud and Hansen 1981). Extended hot, sultry summers and moderately cool winters are normal. The summers typically have 85 days with highs greater than 90 degrees Fahrenheit. The winters are marked by brief cold periods with little snow. Average winter highs are in the mid-50's and average summer highs are in the low 90's. The mean January low does not fall below freezing. This leads to a relatively long growing season of 220 days (Skiles n.d.).

The average annual precipitation is 50 inches. Rainfall is well distributed throughout the year, ranging from three (3) -four (4) inches per month from June through November, and four (4) -six (6) inches per month from December through May (Smith 1989). The average annual runoff in the watershed is 18-20 inches, with most of it occurring from December to April. Evaporation exceeds precipitation in the driest summer months (Skiles n.d.). These climatic values subsequently shape ecosystem processes and functions.

During 1999, a forest inventory was conducted on the pine plantations greater than 26 years of age. The purpose(s) of this inventory was not only to identify volumes and size

¹Includes power lines and natural gas lines. R-O-W existed prior to Service ownership.

classes but also to determine stocking rates of advanced hardwood regeneration present in the understory of these plantations. An inventory of the native forest communities was conducted in 2000/2001 with assistance of refuge staff from throughout the Lower Mississippi Valley. Sampling intensity was one percent of the total land area and was conducted on a systematic line/plot grid using 1/5 acre plots. In addition to standard forest inventory data, additional parameters were measured at each plot (e.g. heights, vertical position, stem crown widths, densities, percent plant material occupancy, etc.) at upper, mid and lower level strata to assist in describing forest bird habitat conditions. These additional parameters corresponded, in part, to standard bird point count vegetative sampling techniques and were developed with extensive consultation/coordination of leading forest dwelling land bird scientists in the southeast. Appendix A provides a copy of the data sheets developed and utilized in this effort. These inventories along with vegetative data collected at over 40 point count locations on the refuge forest provides the base line habitat information presented in this document.

2. Description of refuge habitat:

Vegetation

Pond Creek NWR is an extensive wetland complex comprised of the forested overflow bottoms and riparian forests of the Little and Cossatot Rivers. The refuge is approximately 95 percent forested with small areas of open water, shrub swamps, beaver ponds, and roads. The plant communities are complex and reflect the small elevation changes, complex soils, complex hydrologic regime, and other ecosystem processes that have created and maintained a highly diverse plant community across the refuge. The forested matrix contains mostly natural second- and third-growth bottomland hardwood forests, with inclusions of a loblolly pine component on high terraces and stringers of riparian forests along the Little and Cossatot Rivers, cypress swamps and cypress-lined oxbow lakes, buttonbush shrub swamps, and young pine plantations. The canopy trees in this mostly hardwood community are roughly 50-70 years old with scattered patches of much older trees where topography and drainage patterns precluded timber harvest (The Nature Conservancy 1995; Arkansas Natural Heritage Commission 1991).

Pond Creek NWR is a fertile area with a high site index, fast tree growth, and quick recovery from disturbance (Arkansas Natural Heritage Commission 1991). The forest community includes an abundance of oaks (water - *Quercus nigra*, willow - *Quercus phellos*, overcup - *Quercus lyrata*, Nuttall's - *Quercus texana*, cherrybark - *Quercus pagoda*, cow - *Quercus prinus*, white - *Quercus alba*, Shumard - *Quercus shumardii*, delta post - *Quercus similis*) and hickories (water - *Carya aquatica*, pecan - *Carya illinoensis*, shellbark - *Carya laciniosa*, bitternut - *Carya cordiformis*, mockernut - *Carya tomentosa*). Other species present include bald cypress (*Taxodium distichum*), loblolly pine (*Pinus taeda*), American holly (*Ilex opaca*), river birch (*Betula nigra*), red and silver maple (*Acer rubrum* and *A. saccharinum*), sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), blackgum (*Nyssa sylvatica*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), and green ash (*Fraxinus pennsylvanica*). The understory includes small trees and shrubs such as swamp and rough leaf dogwood

(*Cornus alternifolia* and *C. drummondii*), American holly (*Ilex opaca*), buttonbush (*Cephalanthus occidentalis*), pawpaw (*Asimina triloba*), hornbeam (*Carpinus* spp.) and switchcane (*Arundinaria gigantea*). These forests also contain a heavy vine component that adds substantially to the vegetative diversity (The Nature Conservancy 1996). Due to the diversity of the forested communities at Pond Creek NWR, it is difficult to identify and virtually impossible to accurately map Society of American Forester's stand types on the refuge. The decision was made to utilize the top three tree species that had the highest basal area present in the overstory and midstory to represent the stand type for any given location. Forest cover type maps are provided in the compartment summaries, pp 49 to 78.

The forests in this area have been selectively harvested since settlement, except perhaps for a few isolated stands of bottomland hardwoods and cypress-lined lakes which appear uncut. The bottomland forests have retained their species diversity but appear relatively even-aged without some of the structure found in old-growth forests. Very large trees, apparently ancient culls, and small stands of old growth are scattered throughout the bottoms mostly in the wettest and least accessible areas. The stands present along some stream systems, apparently placed in stream side management zones by the previous owner, exhibit less disturbance than most of the forest proper. The most impacted forest communities were found on the drier sites and areas easier to drain (The Nature Conservancy 1995). Prior to settlement, it is likely that willow, water and cherrybark oaks along with some composition of loblolly pine on the stream terraces were the dominant trees across much of the refuge. Obviously, wetter site species such as Nuttall's oak, overcup oak and cypress occurred along and in the stream courses, oxbow lakes and low elevation sites. A thorough analysis of pre-settlement vegetation is not available for this section of Arkansas; however, the community composition appears at least partially in tact albeit with a younger structure and a higher than normal defect rate. Locally, recent silvicultural practices in the area have resulted in a much younger forest, with 25-30 percent in early successional stages and/or young pine plantations.

Southern forested wetlands have always been subject to natural disturbance. Weather phenomena, especially wind storms, ice storms, and severe drought, cause short-term permutations through the creation of gaps and episodic reproductive events. Flooding, even severe events, is probably not a major negative force due to the diffusing and buffering effects a large forested wetland has on floods and the fact that most species occurring in a flood plain are water tolerant to some degree. The natural meandering of river channels does cause disturbance by removing land from one bank and depositing it on the other.

The area around Pond Creek NWR is rural with forests occurring on roughly 70 percent of Sevier County. The remainder of the county has 26 percent of the total land area in small family farms devoted to livestock and/or hay production with only four (4) percent of the total land area under crop production (U.S. Dept. of Agriculture, 1992). Commercial forest industry is the largest landowner and owns 49 percent of all county

forested acreage. Non-industrial private land owners, other corporations and the U.S. Government own 34, 13 and four (4) percent, respectively, of the forest lands in this county (USDA, Forest Service, 1995). Virtually all of the forest industry ownership and significant amounts of the remaining forested ownership have been converted to short rotation loblolly pine plantations.

Competition between native and non-native species

Silvicultural activities by previous owners resulted in over 6,000 acres of monoculture, loblolly pine plantations being established on sites that were originally mixed species bottomland hardwood forest stands. These plantations were established by clear cutting the native hardwood stands, performing various site prep actions such as debris removal, herbicide spraying some sites, bedding, constructing drainage ditches and planting pine seedlings. Although loblolly pine is a forest component on higher elevation sites in Pond Creek NWR, it does not normally occur as a dominant species. Loblolly pine normally occurs as an incidental in mid to upper elevation sites with an occasional ridge site having 10-20 percent of the total stand composition in loblolly pine. Loblolly pine is not considered a climax species in floodplain communities but a transitional or early successional stage species that may establish itself on higher elevations following catastrophic events such as drought or storms and field abandonment. It may persist for long periods of time (up to 120 years) and individual stems can develop truly impressive size due to high natural soil fertility of floodplain areas.

In their current form, all of the monoculture loblolly pine plantations on Pond Creek NWR are considered non-native communities and cause direct adverse impacts to priority wildlife species due to lowered habitat productivity when compared to native, mixed species bottomland hardwood stands. One of the primary habitat objectives established in the Pond Creek Comprehensive Conservation Plan (CCP) is the conversion of these offsite pine plantations back to native, mixed species bottomland hardwood forests. The CCP and this plan establishes a conversion period of approximately ten (10) years to complete this action through application of silvicultural practices such as total stand removal (clearcutting), hydrology restoration where necessary and replanting native, mixed species hardwoods. From initial inventory work, it appears that up to ½ of the plantation acreage may have adequate stocking of advanced hardwood regeneration and will not have to be replanted once the pine overstory is removed.

Soils

The soils provide further evidence of the complexity of the Pond Creek system. The majority of the soils are hydric and form two broad series of soil groups.

The Guyton-Sardis soil series group consists of deep, usually level, poorly drained loams and silty loams formed from alluvium on floodplains and terraces. These soils are often sorted by particle size, creating clay lenses and perched water tables as well as restricted areas of well-drained deep sands. This series group is also associated with more recent alluvium and riverine deposits (U.S. Soil Conservation Service 1984).

The Smithdale-Sacul-Savanna-Saffel soil series group contains deep, moderately well drained, and well drained loamy soils formed in loamy and clayey deposits from marine sediments. These soils date from older Cretaceous age sediments with some input of clay size particles during recent (Holocene) flood events (U.S. Soil Conservation Service 1974, 1984).

Both groups of soils are rich and fertile and support a diverse bottomland hardwood forest cover. They are subject to a low erosion hazard and have high capability to recover after disturbance.

Hydrology

Pond Creek NWR is located on the floodplain at the junction of the Little and Cossatot Rivers upstream from Millwood Lake. Generally, the Little River forms the southern boundary of the refuge and the Cossatot River forms the eastern boundary. The refuge's northern boundary follows the Woodbine escarpment, a relatively abrupt rise that separates the bottoms from the uplands. Pond Creek runs through the middle of the refuge, with approximately half of its watershed within the refuge and many of its south-flowing tributaries reaching into the uplands directly north. Open water covers about two (2) percent of the refuge. Stream flows have been radically altered within the past 50 years due to construction of large floodwater retarding structures on virtually all stream systems within the area. In general, natural overbank flooding peaks (maximum flood water elevations) have been lowered but duration (hydroperiod) of flooding on lower elevation sites has lengthened substantially as a result delayed discharge associated with the operation of these large dams. Significant parts of the refuge (below 290 feet MSL) is part of the Millwood Lake floodpool with the U.S. Army Corps of Engineers holding a flowage easement on these lands. Flood waters have not been stored on these lands as a result of Millwood Lake operation since its construction in 1966.

An extensive elevated road and drainage network, which was constructed to support silvicultural activities, now modifies and restricts the local water flow patterns. These changes have greatly favored the life cycle and population growth of beaver, resulting in a large increase in beaver density, beaver pond formation, and subsequent destruction of forest stands. Elevated roadways coupled with inadequate openings provided at crossings of drainage systems creates ideal locations for construction of beaver dams with all the associated problems of reduced flows due to restricted culverts.

These hydrologic changes are a complexity laid on an already complex ecosystem. Different parts of the refuge are now adapting in different ways to the various impacts. The highest peaks of flooding have been reduced; the high bottoms and terraces are no longer flooding; and the drying out of the lowest areas is being prevented. Much of the refuge today appears to be wetter longer than it was historically, and the forest cover is changing in response to this hydrologic change (The Nature Conservancy 1995). Ponding by beavers also appears to be more extensive than it was historically, according to the experience of local residents and forest community impacts observed by refuge staff.

The most important aspect of the refuge is its large, functioning forested wetland ecosystem. Although the many direct and indirect hydrologic alterations described above have impacted the processes that maintain the refuge's ecosystem function and plant community composition, forested wetlands are naturally dynamic and display a high resiliency to disturbance due to the nature of the riverine processes that maintain them.

Fire management

Although wildfires may have sporadically occurred historically in some parts of the refuge, the bottomland hardwood dominated forest communities of Pond Creek NWR are not fire adapted systems. Fire, in general, is damaging to hardwood systems and to habitat productivity of these systems. The Fire Management Plan specifically prohibits prescribed fire activities within refuge forest stands. All fire will be aggressively suppressed through by refuge and/or cooperator wildland fire qualified resources.

Wildfire potential on Pond Creek is currently very high due to extremely heavy fuel loading associated with the thousands of acres of artificially established pine plantations. Arson has and will continue to pose a serious threat to the refuge and its resources until these plantations are converted to hardwood stands. The South Arkansas Refuges Complex Fire Management Plan details existing suppression agreements with the Arkansas Forestry Commission and local rural fire departments. Even with these agreements in place, suppression resources available are totally inadequate to deal with high fire danger periods.

Forest pests and diseases

There are many forest pests that are common throughout southwest Arkansas. Most forest pests are present in forest communities continuously but in such small quantities that they go undetected. When conditions begin to stress forest communities, the forest pest may capitalize on the situation and become a problem. Southern pine beetles, isps beetles, and turpentine beetles are all common forest pests that usually attack stressed pine trees. Oak wood borers usually attack oak trees that are mature and possibly under stress. Oak trees are susceptible to several blights and galls that are common in Arkansas. The pests and diseases on a small scale usually do not pose a problem but, when opportune conditions arise, they can spread and cause major habitat destruction through loss of trees.

B. Legal Mandates

As part of the U.S. Fish and Wildlife Service, the mission of the National Wildlife Refuge System is to "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Improvement Act of 1997). This act requires, in general, that refuges restore and maintain the biological integrity, diversity and environmental health necessary to achieve this mission and the purposes established for each refuge. Sound natural resource management practices are

called for to provide optimum wildlife habitats and create an environment where compatible public use will be encouraged.

The refuge was established under the authority of the Emergency Wetlands Resources Act of 1986, which calls for:

"...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international treaty obligations contained in various migratory bird treaties and conventions...." (16 USC 3901 (b), 1100 State 3583).

The Omnibus Parks and Public Lands Act of 1996, which authorized the transfer of land from Weyerhaeuser Company to the Service for inclusion into Pond Creek NWR required the completion of a Comprehensive Conservation Plan (CCP) which:

"...recognize the important public purposes served by nonconsumptive activities, other recreational activities, and wildlife-related public use, including hunting, fishing, and trapping."

Furthermore, this act requires the CCP to:

"...shall permit, to the maximum extent practicable, compatible uses to the extent that they are consistent with sound wildlife management, and in accordance with the National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee) and other applicable laws."

C. Relationship to other plans

The approved Pond Creek NWR CCP, completed in 1999, identifies various step down plans that must be developed to direct the management of this refuge. Among others, the CCP identifies the need for developing and implementing a forest habitat management plan for this refuge. Developing such a plan and implementing the required silvicultural management actions was identified as a critical element to achieving refuge and Service goals and objectives. The CCP, developed with full public involvement and participation during the planning process, provides overall management direction and guidance for the operation and program development at this refuge. Specific goals, objectives and strategies within the CCP that set habitat objectives at this station are presented in Section D. The CCP established the following vision for the refuge as a guide to its present and future management direction:

A model refuge that protects and manages biological diversity for the enjoyment and benefit of present and future generations.

Located in the Red River/Sulphur River/Little River ecoregion, Pond Creek NWR is an important component of public lands needed to achieve the objectives of the North American Waterfowl Management Plan (NAWMP). This refuge is geographically positioned in an area where the Central and Mississippi flyways overlap along the Red River, a traditional waterfowl migration corridor (Fish and Wildlife Service, 1994). This plan identified the need for additional acquisition of public lands in this area devoted to migratory bird management. The refuge not only contains outstanding habitat for waterfowl, but also for migratory non-game forest land birds. Developing and

implementing a refuge habitat management program designed to improve and maintain high quality migratory bird habitat directly contributes to the achievement of NAWMP objectives.

The refuge is part of the Service's Arkansas-Red River Ecosystem (ARRE) which covers parts of nine states and includes portions of four Service Regions. Within this ecosystem, the refuge is located along the Little River, one of the major tributaries of the Red River. The ecosystem plan, finalized in 1996, contains the following vision for Service field stations and personnel in this area: "The vision of the ARRE Team is the efficient and effective management of federal trust fish and wildlife resources of the ecosystem to conserve and restore biodiversity for the benefit of the people." This plan establishes several major objectives including "Conserve and Restore Focus Habitats" (specific strategies developed for several plant communities, including wetlands and bottomland hardwood forests) and "Focus Species Conservation and Restoration" (specific strategies for migratory birds and listed species). Development of active habitat management designed to restore and maintain diversity of the floodplain hardwood systems contained on Pond Creek NWR directly supports the objectives of the ARRE Plan.

III. Resources of Concern

Fish and Wildlife

Bottomland hardwood ecosystems are very productive habitats for a wide array of fish and wildlife species. The refuge and the surrounding area are no exception. The refuge's abundance of high quality forested wetlands provides outstanding habitat for a diversity of fish and wildlife.

In general, a thorough base-line inventory documentation of the population status of most species of wildlife in the refuge has not been conducted. The absence of a nearby college or university has resulted in a limited amount of available research or survey information. Omissions of certain wildlife species in this document may therefore represent a lack of information rather than a lack of concern about those particular species.

Mammals.

The only attempt at producing a comprehensive species list for public lands in the Cossatot/Little River region has been for Little River National Wildlife Refuge (NWR) in southeastern Oklahoma, located about 15 miles west of Pond Creek NWR. Some 48 mammalian species are listed as occurring or likely to occur on Little River NWR (Berlin Heck, pers. comm. 1997). The only preliminary species list for mammals occurring in the immediate Pond Creek NWR area was conducted by The Nature Conservancy, with only 17 species of mammals positively identified (The Nature Conservancy 1996). However, due to the geographical proximity and similarity in habitats between the Pond Creek and Little River NWRs, it is reasonable to assume that the diversity and abundance of mammalian species are similar for the two refuges.

Important game species occurring on Pond Creek NWR include white-tailed deer and gray and fox squirrels. On the refuge, the deer population is thought to be below carrying capacity due largely to unmanaged hunting pressure prior to Service acquisition. However, the current habitat conditions are excellent, and deer numbers are increasing as a result of increased protection and management.

Gray and fox squirrels are both abundant, particularly where suitable mast-producing hardwoods are available. Although the habitats of these two species overlap, gray squirrels prefer deep woods with a heavy mid-story vegetation, whereas fox squirrels tend to favor small woodlots and the edges of larger forested tracts. Due to their high potential recruitment rates (directly associated with availability of mast) and high natural mortality rates, it is unlikely that any long-term changes in squirrel population densities have occurred within the available floodplain hardwood habitat.

Cottontail rabbits and, to a somewhat lesser extent, swamp rabbits, are common in this area. Their basic high recruitment and mortality rates coupled with significant amounts of early successional stage habitat created by the silvicultural actions of the previous land owner result in a good rabbit population.

Several species of bats are native to this region. One species of concern is the Rafinesque's big-eared bat. This bat is known to use large culls on Pond Creek NWR for nesting and brood chambers. Population status is unknown.

A number of furbearers, including beaver, nutria, muskrat, raccoon, opossum, mink, river otter, coyote, red fox, gray fox, striped skunk and bobcat are collectively abundant. Among this group, the beaver, nutria, muskrat and mink are usually associated with the more permanently inundated wetlands and riverine systems. The raccoon is well-adapted to all existing habitats, and the opossum, coyote, fox and bobcat are mostly associated with upland habitats. Most furbearers are distributed throughout the ecosystem.

Little or no information is available to provide population indices for these species. However, beaver and raccoon population levels have become quite high in recent years, probably associated with depressed fur demands. These two species are of major concern because of their potential to significantly impact ecosystem functions. An increased beaver population has altered the area's hydrology by causing more dams and beaver ponds to be built, inundating the bottomland forests and keeping them underwater for prolonged periods. In addition, beaver have become a greater nuisance problem to private landowners in the area. The negative impacts of high raccoon populations include their effect in reducing populations of migratory and resident birds. Raccoon predation may be adversely affecting reproduction of breeding neotropical migratory birds (Cooper and Ford 1993) and ground-nesting wild turkeys (Moore 1993) in the hardwood habitats of Arkansas.

Birds.

The hardwood-dominated forests and forested wetlands of Pond Creek NWR provide outstanding habitat for an abundance of bird life. As with mammals, the Little River NWR is the only public land in the region with a checklist of species, with 198 avian species listed as either occurring on or migrating through the refuge (Berlin Heck, pers. comm. 1997). The Nature Conservancy (1996) has a list of 133 species of birds identified on Pond Creek NWR. Much seasonal variation occurs in avian species composition and populations in the area because much of the bird use is by migratory species. Some neotropical migratory songbirds use these habitats for breeding in the spring and summer and others during migration in the spring and fall. The forested wetlands of Pond Creek NWR are also used by migrating and wintering waterfowl during the fall, winter and spring. Finally, a small number of resident species use the habitat year-round.

Waterfowl, primarily mallards, gadwall and wood ducks, have traditionally used the seasonally flooded wetland habitats of the refuge. Other species of lesser occurrence include wigeon and green-winged teal. Flooded beaver ponds and sloughs provide excellent nesting and brood-rearing habitat for resident wood ducks. The hooded merganser, another cavity nester, is an uncommon breeding species in the region, and does not occur anywhere in large concentrations.

The Lower Mississippi Valley is one of the six highest priority habitat regions identified in the North American Waterfowl Management Plan (NAWMP) as requiring special attention and conservation action (Yaich 1990). Within the Lower Mississippi Valley, ten (10) management units were delineated for Arkansas. One of these units is the Red River-Sulphur River-Little River Unit in southwest Arkansas, which encompasses the refuge area. Although waterfowl populations for this region are low compared to those in the more extensive wetland and river systems of the Mississippi Alluvial Valley of eastern Arkansas, the numbers of waterfowl that use the area are adequate to provide a base from which to build larger populations through wetland protection and enhancement.

Many species of neotropical migratory songbirds are experiencing long-term declines as a result of widespread habitat loss and fragmentation. Bottomland hardwood forests and riparian woodlands have been identified as a top habitat conservation priority throughout the southeast (Hunter et al., 1992). Conservation and management of the critical bottomland forests on the refuge will enhance the breeding, wintering, and transitional habitats for many species of migratory and resident songbirds. Some of the more commonly occurring bird species include the Carolina chickadee, tufted titmouse, Carolina wren, prothonotary warbler, northern cardinal, and white-throated sparrow. The forested wetlands of the refuge are also frequented by many species of wading birds, including the great blue heron, little blue heron, green heron, cattle egret, snowy egret, great egret, anhinga, and yellow-crowned night heron. Four known colonial nest sites (rookeries) exist on the refuge. The species composition of these rookeries is not known, but it could include several herons and egrets.

The wild turkey is the primary resident game bird in the ecosystem. Turkey populations have remained quite low in the area in recent years, probably due to over-exploitation from illegal harvest and poor quality habitat caused by large scale conversion of native communities to pine plantations or other land uses. In addition, high levels of predation on turkey nests, especially by raccoons, may also cause a significant negative impact on this species.

Reptiles and Amphibians.

Reptiles and amphibians require quality wetland habitat for their survival, and they may be an important indicator species of environmental well-being. The damp, forested bottomland hardwood habitat of the refuge is conducive to an abundance and diversity of reptiles and amphibians. As with the other wildlife groups, detailed information on the species of herpetofauna found on the refuge is lacking. A preliminary list compiled by The Nature Conservancy (1996) includes 23 species of reptiles and ten (10) species of amphibians.

Some reptiles thought to commonly occur on the refuge include the common snapping turtle, Mississippi mud turtle, American alligator, red-eared slider, black rat snake, broad-banded water snake, canebrake rattlesnake and western cottonmouth. Alligator snapping turtles, the largest of the turtle group and attaining sizes of up to 200 pounds, were once more abundant and widespread throughout the southeast. However, due to recent exploitation, their numbers have been reduced in many areas, including the Cossatot-Little River ecosystem. Because of concerns about the recent population reduction and the unknown reproductive capabilities of this long-lived species, the Arkansas Game and Fish Commission halted all take of alligator snapping turtles in Arkansas in 1994.

Amphibian species thought to be common in the refuge area include the smallmouth salamander, dwarf American toad, five-lined skink, green tree frog and southern leopard frog. No threatened or endangered amphibian species are known to occur. However, recent research findings indicate that amphibian populations, particularly frogs, are undergoing significant population declines throughout the world. Also in the United States, alarming numbers of frogs of various species are being observed with deformities such as abnormal organs, feet, and toes.

Fish.

The refuge has a diversity of aquatic habitats that include rivers, creeks, oxbow lakes, beaver ponds, swamps, and borrow pits varying in size and depth. These waters provide sportfishing opportunities for bass, bream, catfish, and crappie. The oxbow lakes, Little River, and Cossatot River have primitive boat launches that provide some access.

The southeastern portion of the refuge joins Millwood Lake, a 20,000-acre artificial impoundment that provides excellent fishing. One improved boat launch and parking lot is located off U.S. 71, where the Little and Cossatot Rivers converge and proceed into Millwood Lake.

No attempt has been made to prepare a comprehensive fish species list for the Pond Creek NWR. The Little River NWR has a list of 68 species. It is reasonable to assume that the same species of fish occur on Pond Creek, since the two refuges are part of the same drainage system.

Threatened, Endangered, and Candidate Species.

The federally listed American alligator (threatened by similarity of appearance) is present in the lakes, sloughs, and streams of Pond Creek NWR. Wintering populations of threatened bald eagles also occur at Pond Creek where they traditionally utilize the extensive permanent water wetland communities present throughout the area. Interior least terns (endangered) are known to occasionally utilize the sand and gravel bars of the nearby Red and Little Rivers. The threatened leopard darter occurs in the Cossatot River which bisects part of the refuge. In fact, designated critical habitat for this species is present on a river segment upstream of the refuge. Historical ranges of the American burying beetle (endangered) and the scaleshell mussel (endangered) include this part of southwest Arkansas but the species have not been identified in the immediate area. The endangered pondberry (*Lindera melissifolia*) may be present in one large, permanently moist depression located on the west side of the refuge. Other listed species present include the Ouachita rock pocketbook mussel and the pink mucket pearly mussel. These endangered mussels occur in both the Little and Cossatot River systems.

In addition, Arkansas Audubon has identified 62 species of birds classified as Arkansas Birds of Conservation Interest (ABCI). This classification is assigned due to continued downward trends in population and/or continued loss of habitat. Many of these ABCI species utilize the wetland forest communities of Pond Creek NWR at various times of the year and include black and yellow crowned night herons, wood stork, hooded merganser, American woodcock, northern harrier, sharp-shinned hawk, Cooper's hawk, red-headed woodpecker, loggerhead shrike, wood thrush, prothonotary warbler, Swainson's warbler and worm eating warbler.

Other species exhibiting populations declines and of concern to Service partner conservation organizations include the Rafinesque's big-eared bat, rabbitsfoot mussel and alligator snapping turtle. This bat uses large hollow trees within the area for nursery/roosting sites (The Nature Conservancy, 1996). Suitable habitat for the rabbitsfoot mussel is restricted to the river systems of the area while alligator snappers likely use permanent water wetlands throughout the year.

Pond Creek NWR provides habitat for a broad array of wildlife species and as can be seen from the brief discussion above, this includes many listed or candidate species and species of concern to conservation partner organizations. Habitat needs, protection and actions designed to enhance suitable habitat conditions, for the species, to the extent practical, must be considered in all management activities.

Archaeological Resources

Literature reviews and extensive discussions with area professional and amateur archaeologists have identified 14 cultural resource sites on Pond Creek NWR, see Pond Creek NWR Archeological Site & Cultural Resource Map. Consisting exclusively of Native American sites, these areas are located on refuge maps and will be provided full protection as provided by Archaeological Resources Protection Act. These maps are not included in plans that will receive wide distribution in order to provide protection. There are no National Register sites. The Service's Regional Archaeological Officer will be provided draft copies of all management prescriptions and location maps for review/coordination with the Arkansas Archaeological Officer and the State Historic Preservation Officer prior to implementing any silvicultural actions to assure protection of these sites. The CCP identifies the need for an archaeological survey at Pond Creek NWR.

A. Identify the priority species, species groups, and communities

Based upon the discussions previously presented, the priority species of consideration for this refuge, are those classed as threatened or endangered and candidate species for listing (T& E species), migratory birds (waterfowl and non-game forest dwelling birds) and resident wildlife (including game and non-game species). Presence in and utilization of refuge habitats by these species and/or species groups was previously presented. Legislative mandates, purposes and specific guidance established by legislation, refuge purposes, Agency policy and priorities and the goals/objectives set forth in the CCP are detailed throughout this plan. All habitat management actions implemented under this plan will consider the maintenance and/or establishment of suitable habitat conditions, where practical, for these species and species groups as top priority. Habitat management actions, even if conducted specifically for a single species (e.g. a T&E species) would be designed, within practical limits, to also benefit a wide diversity of wildlife and habitat.

Establishing and maintaining desirable habitat conditions for T&E species will be given top priority throughout the refuge when/where these species occur or where specific actions might benefit offsite populations.

Waterfowl, along with migratory non-game birds are assigned a high priority in those elevations falling within the five year flood plain (generally < 275' MSL). This area experiences annual overbank flooding and contains oxbow lakes, sloughs, beaver ponds and drains, all routinely providing habitat for wintering waterfowl. This area is exclusively forested with mixed species floodplain hardwoods. This same general area has excellent potential for non-game bird utilization and, in fact, currently receives heavy use from this species group. Resident wildlife values are also high, due in part to a high mast producing component in the various stands. Mast producing tree and shrub species will be favored in all management actions within the limits of compositions set in other parts of this plan. A total of about 3,800 - 4,000 acres falls within this elevation range.

Within the 275-285' MSL range (generally above the level of waterfowl utilization), forest dwelling non-game migratory birds will receive highest priority consideration. These sites are forested with mixed species hardwoods, an occasional scattered loblolly pine stem or small clump of pines, a highly diverse mid-story and a heavy vine component. This elevation range has the highest forest vegetative diversity with many stands routinely having 30+ species present. These sites are generally transition areas moving upslope to high terraces or off-refuge upland escarpments. Unfortunately, it is within this area that most of the conversion to loblolly pine monoculture occurred. Of the 12,800 - 13,000 acres within this elevation range, an estimated 4,000 acres(±) is now in pine plantations. Extensive stands of switch cane occur within this elevation class which provides exceptional quality habitat for species such as Swainson's warbler. Resident wildlife values are also high within this area and will be given consideration in all management actions.

The highest elevation sites (>285' MSL) occur along stream terraces, abandoned stream meanders and upland escarpments. This community typically is above the 25 year floodplain and rarely floods. It generally exhibits a small native loblolly pine component throughout its limits and generally has a high American holly component. It will be specifically managed to produce 'super' dominant crown class trees in an attempt to provide habitat requirements for swallow-tailed kites and other smaller species. Loblolly pine, where it occurs as a natural stand component, will be used as the forest species for producing super dominant crown class trees. In addition, small patches of pine plantation (5 acres) will be retained at a rate of 4 patches per 100 acres when the plantation occurs in these high elevation sites where pine occurs naturally. Acreage in this elevation range is roughly 9,600 - 9,800 acres (±). However, it frequently occurs in narrow ridge top terraces that literally run for miles paralleling stream courses throughout the refuge. Due to the juxtaposition of this community to not only open water systems but also extensive stands of floodplain hardwood forest, it is important to many species of migratory non-game birds and resident wildlife.

Avifauna analysis was completed by refuge staff and Service/non-Service bird biologists and researchers during the CCP planning process. This analysis, based upon West Gulf Coastal Plain Partners in Flight Bird Conservation Plan (BCP) criteria, was conducted in order to establish tentative non-game migratory bird suites and indicator species for each suite. This analysis is presented in Appendix B for reference purposes. Other analysis conducted for this area was performed by Lower Mississippi Valley Joint Venture's West Gulf Coastal Plain Landbird Working Group. The analysis from this group is presented in Appendix C and D. The indicator species identified by BCP (e.g. highest score by habitat component) is as follows: understory - Swainson's warbler and Kentucky warbler; mid-story - prothonotary warbler; overstory/canopy - swallow-tailed kites and cerulean warbler. These individual species were selected to serve as indicator or representative species for these specific elements or layers of the forest structure. The assumption is made that, in general, if habitat requirements are established and maintained for these

birds in these forest layers, the conditions present will also meet the needs of a wide array of other bird species (e.g. bird suite) that utilize this same forest structure element for their life requirements. Selection of these birds as indicator species was made by both Service and non-Service bird biologists and research scientists and represent the best state-of-the-art information/habitat requirement criteria currently available. Selection of these species and identification of optimum habitat conditions for each must be considered tentative until actual effects/response to management effort is monitored across time. Finally, selection of these species and the corresponding bird suites they represent was based upon present refuge habitat conditions and potential conditions that should develop following application of needed silvicultural actions. It is not the intent of this plan or the Service to attempt radical changes from what is viewed as native flora and fauna compositions but rather to address specific management actions designed to produce optimum, long term habitat conditions for the priority species.

The need to develop and implement an active forest habitat management program was identified in the CCP and repeatedly captured throughout that document. In fact, this need was viewed as paramount by the public, the CCP planning team and the multi-agency, multi-disciplinary habitat management team that developed the suggested habitat parameters reported in later sections of this document. This program, of necessity, will include forest management silvicultural actions such as thinning, group selection, and clearcutting (of off-site pine plantations to re-establish native hardwoods) to achieve and maintain the habitat conditions necessary to meet priority wildlife objectives. Further efforts to justify the need for active habitat management will not be made in this document.

B. Identify habitat requirements

As stated previously, T&E species and their habitat needs will be given top priority in all management actions. The vast majority of the listed species known to be present or where the published home range includes this general area are riverine dependent and occur only in river systems or permanent water areas (mussels, leopard darter, alligator). Opportunities to reduce negative impacts and benefit these species are limited to establishment of streamside management zones (SMZ's) and adhering to Arkansas Forestry Best Management Practices (BMPs). Within SMZ's, active forest management will be restricted to only essential actions addressing issues such as public safety or individual tree removal to achieve spot specific site requirements such as super dominant or emergent crown class development. Disturbance to ground conditions will be minimized in order to assure minimal offsite sedimentation.

Bald eagles overwinter on the refuge where they extensively utilize the rivers, streams and oxbow lakes. Aerial surveys by refuge and partner organizations have not identified roost sites or nest locations on the refuge. Use typically involves feeding activities by individual birds. As with the riverine species group, habitat requirements for this species is such that few opportunities exist to provide positive habitat improvements through

forest management actions. Some minor improvements may result through the development of emergent stem canopies on high terraces associated with stream systems which might serve as future nest trees. There are no known eagle nests currently on Pond Creek NWR.

Pondberry is a federally listed shrub that occurs in wet depressions in sandy soils. One small colony of pondberry was possibly located in a wetland depressional area during forest inventory data collection. Subsequent to this discovery, extensive but unsuccessful searches of suitable habitat sites were conducted. Refuge staff will continue searches during all activities to further document status of this species. Sites with pondberry will be completely protected with buffer zones during any silvicultural actions.

Rafinesque's big-eared bat is known to use large, hollow trees on Pond Creek NWR for roosting and for brood/nursery chambers. Subject experts have visited the refuge to view existing habitat conditions and provided some minimal management recommendations. These recommendations included retention of all suitable den trees (≥ 24 " DBH with full length cavities - hollow trunks - throughout the entire forest) and retention of a significant old age class component (75 years old +) throughout the area for development of future den trees. Presence of adequate numbers of suitable den trees is viewed as a major limiting factor for this species, range wide. Refuge staff was encouraged to protect bald cypress, water tupelo, sycamore and blackgum along/in stream courses since these species in these site conditions tend to have the best chance of developing suitable cavities. Study proposals to examine on-site habitat utilization, population status and habitat requirements for this elusive and relatively unknown species were discussed and efforts made to procure needed funding.

As stated previously, forest management activities implemented at Pond Creek NWR to achieve the habitat needs for migratory birds and resident wildlife will fully consider native tree species and wildlife species compositions most suited to specific sites. Emphasis will be placed upon development and maintenance of high forest tree species diversity within the constraints of what species generally occur within specific site conditions. Such diversity not only mimics natural forest diversity but provides a wide range of habitat conditions for the widest possible range of wildlife species. Mast producing tree species, both hard and soft mast, will be favored in silvicultural actions due to the high value of these species to a wide array of wildlife, including waterfowl and resident wildlife. As a general rule, however, composition of these species groups (oaks, hickories, sugarberry, dogwoods, etc) would be lowered when/if they individually were to occupy in excess of 50 - 60 percent of the stand composition at any given location in order to perpetuate greater stand diversity. The presence of internal stand structure, both horizontal and vertical along with the spatial arrangement within the stand is a critical habitat component for virtually all priority species for this refuge. Where internal stand structure, represented by forest floor vegetation, stand mid-story, etc., is absent or lacking, immediate thinning to reduce overstory canopy closure is needed while

continuing to focus on maintaining overstory species diversity. Patchiness, also a critical habitat element for many forest birds and game species, is typically measured in terms of spatial relationships of reproduction clumps or shrub clumps, coupled with early successional stage plants such as vines and herbaceous growth to closed canopy/more open stand conditions. These habitat conditions of patchiness, where absent, can be established through implementation of small group selection 'holes' (1/2 - 1 acre) where the overstory is removed. At the same time, these holes would serve a dual function of initiating regeneration to achieve uneven-age stand conditions. Retention of 10% of existing old age class stems (75 years +) throughout each stand to deliberately create an old growth component by leaving older stems of long lived species (oaks, cypress), will provide an abundance of cavities due to high levels of naturally occurring defect within these old age classes. The forest management program developed will not focus on arbitrary parameters such as establishing a predetermined "rotation age" of the forest community for management purposes. Rather, the need for treatment or implementing a silvicultural action will be solely dependent upon wildlife habitat needs of the area - not some assigned stand age structure as a trigger for treatment.

These general comments address the broad range of habitat conditions that meet the needs of priority species for this refuge. Efforts were undertaken to further refine these general habitat requirements and develop specific habitat parameters that capture not only these generalities but also details specific guidance that will be used in all silvicultural actions. These specific guidelines, presented below, were developed by a team of refuge foresters and biologists from multiple refuges and Regions, Service WHM Division Biologists, Regional Forester for the Southeast Region, and non-Service scientists and researchers. Chuck Hunter, FWS WHM, Randy Wilson, FWS WHM, Paul Hamel, USDA Forest Service, Dan Twedt, USGS (BRD) and Doug Zollner, TNC, were among the participants in this effort. This team spent several days in field reconnaissance and ultimately developed these parameters to serve as initial guidelines. The reader and refuge staff must remember that the knowledge base, particularly for forest birds, is constantly changing as new research is completed. These parameters must be viewed as a beginning point, not an end point since they will be refined, modified or changed as experience, response to management actions and/or new research data is developed. Major changes in knowledge that results in significant changes in recommended management actions should be incorporated by amendment to this plan.

The following information details a numerical range for multiple parameters at multiple layers within the bottomland hardwood forest community at Pond Creek NWR. These values (and ranges of values) were developed based upon providing suggested optimum habitat conditions for the identified wildlife priorities given above, including the specific indicator forest bird species. In other words, when forest stand conditions (identified through inventory data collection activities) approximate the parameter values developed by the team, habitat conditions for the priority species and non-game bird suites utilizing that forest layer are considered to be approaching optimum conditions.

Obviously, there are many components that influence the quality of habitat provided to specific wildlife species; these components become a detailed list of what the forest canopy layers, forest floor vegetation and forest patches should be at any point in time. Of necessity, the stand components selected for use must be those that can be routinely evaluated through forest inventory data collection efforts. Funding and staff constraints routinely available for refuge forest management efforts preclude exhaustive parameter data collection efforts across extended periods of time (years); therefore, this effort focused upon selecting parameters that could be easily and accurately measured by technicians, were descriptive of the habitat values present, and would provide a reliable 'picture' of habitat conditions. Also, the refuge staff desired to incorporate forest bird point count vegetative analysis parameters and methods into refuge forest inventory data collection processes where possible. The intent of this effort was to enable application of actual, on-station point count bird data (bird species composition and numbers) across entire stands of the refuge forest. For example, bird point count data across multiple years at any specific point count or group of point counts reveal actual bird species compositions and numbers of individuals. The habitat parameters present at these point count locations are quantified by data summaries representing analysis of various vegetative parameters at multiple levels in the forest canopy at those specific locations. With similar vegetative parameters to those examined at the point count locations quantified throughout the forest, application of bird utilization data obtained from point counts should be possible across any forest segment with similar habitat conditions and should provide a useable monitoring tool for trends/response. One final note in this discussion should be mentioned - forest bird experts that were part of this team were provided vegetative data summaries collected through inventory effort of multiple stands and asked to evaluate these stands (sight unseen) based upon this data for the priority species. They then performed field reconnaissance visits to these stands to ground truth this evaluation. Through this effort, changes were made in the parameters selected for evaluation and definitions developed to better describe the forest habitat conditions.

SUGGESTED OPTIMUM HABITAT PARAMETER VALUES FOR PRIORITY BIRD SPECIES IN FLOODPLAIN HARDWOODS POND CREEK NATIONAL WILDLIFE REFUGE

Canopy (overstory)

1) Forty (40) - 70 percent of the overstory space occupied with foliage during leaf out; these values correspond to 60 - 90 square feet of total basal area/acre. Stand values above these ranges should immediately trigger silvicultural action (thinning) to reduce stand basal area.

2) Seventy (70) percent of all forest cruise data inventory 1/5 acre plots to have a vine component in the canopy for each stand. Substantially lower numbers (< 50

percent) in this parameter throughout a stand should result in target stand basal areas in the lower end of the range in # 1 above to stimulate vine growth.

3) Single emergent super-dominant trees present on either (a) 5-15 percent of plots have emergent crowns or (b) approximately 50 percent of plots contain "large" canopy, super dominant crown class trees. Values below these minimums should trigger silvicultural action to correct stand condition; values above these minimums are considered in optimum condition for the priority species in question. Definition of a emergent super-dominant stem for this parameter is a tree that is a minimum of 20 percent taller than the surrounding canopy layers.

4) Average tree crown diameter in the stand should be $> 45'$. This measurement is the average of the longest and shortest diameters of the crown of the dominant or co-dominant tree in each prism plot that is closest to the prism point. Stand values substantially below this level should trigger silvicultural action to implement thinning and encourage lateral crown growth. After treatment stand basal area targets should be within the lower limits of the range in # 1 above.

5) Retain a minimum of two den trees in the dominant/co-dominant crown class per ten (10) acres during all treatment actions - stems that can reasonably be expected to survive for an extended time. In addition leave a target of two (2) suitable den trees $> 24"$ DBH per ten (10) acres if available, to meet habitat needs of bats.

6) Retain all snags during any silvicultural action. Old growth stands routinely contain around 20 - 40 per ten (10) acres in the $> \text{four (4) inch DBH}$ class. Safety would be an exception to this requirement.

7) Patches or forest openings (horizontal stand structure) roughly one-half to - two (2) acres in size that are occupied by herbaceous, forb, vine, shrub and forest regeneration should be present throughout the stand. Vegetation height in these patches should be in the understory height class ($< \text{ten, } 10'$) for the stand in question. A preliminary target is set at one such patch per ten (10) acres. Silvicultural actions implemented to correct any of the above parameters should also focus on establishing this parameter criteria. Note: Bird biologists/scientists did not set this criteria even though much discussion revolved around the importance of forest openings to the priority wildlife species on this refuge - it is set as a management recommendation by the refuge staff to capture the spirit of this need and will be adjusted across time and across various mixes of stand conditions based upon indicator wildlife species response.

8) Establish or maintain high tree species diversity of those species naturally occurring on any particular site. Favor soft and hard mast producing species up to the point where a particular species or species group does not exceed 50-60

percent of the stand composition and where maintenance of high stand tree species diversity is still maintained.

9) Target maintaining or establishing stand structure that approximates the following: 10 percent of stand basal area in large, dominant, old age class stems; 50 - 60 percent of the stand basal area in mid-size dominant/co-dominant stems and 30 - 40 percent of the stand basal area in mid-story canopy classification. These percentages are approximates only and will vary significantly depending upon the age/size composition of any particular stand (e.g. its stage of development) and the need to correct other deficient habitat/forest community parameters. Silvicultural actions should, however, be conducted in a fashion to move any stand treated toward these average values which should approximate mixed species, uneven-aged communities with both vertical and horizontal internal stand structure.

Mid-story

1) Mid-story (> 10' to bottom of overstory canopy) presence throughout the stand should be at a level such that 40 - 60 percent of the available mid-story space is occupied by foliage during leaf out (40 - 60 percent mid-story canopy cover occupancy). Implement silvicultural actions (group selection holes to establish desirable regeneration, release of established regeneration, establishment of forest patch openings, thinning) as needed to achieve and maintain these values.

2) Seventy (70) percent of all forest cruise inventory plots should have vines present in the mid-story.

Understory

1) Understory (3' - 10') foliage occupancy during leaf out of 40 - 60 percent of the space available.

2) Seventy (70) percent of all forest cruise data plots to have vines present in the understory.

3) Switch cane present on 20 percent of all forest cruise data plots on sites where cane occurs as a forest community component (generally above 285' MSL).

Ground

1) Twenty (20) - 50 percent ground foliage coverage during leaf out (20-50% of the ground surface covered by vegetation). Layer is defined as < three feet.

2) Continue to work toward identifying an average number of large dead logs providing coarse woody debris for herps, insects and invertebrates. Short-term creation of woody debris is not a silvicultural management objective - it will be an indirect result of silvicultural actions. It is, however, an important habitat component and is common in forest communities with old age class stems present. Scientists on this team stated that some reports found over 20 logs over 12" DBH per ten (10) acres in forest old growth conditions.

Summary

There are many components that influence the management of the forest canopy for the priority wildlife species. These requirements become a detailed list of what the forest canopy layers should be. The optimum habitat conditions in general is found when basal areas are 60 to 90 square feet per acre. The **overstory**, during leaf out, with 100 percent being total area covered by leaf area, should be between 40 to 70 percent occupied. Five to 15 percent of the stand needs to have emergent crowns. Average crown diameters for dominant/co-dominant stems should be 45 feet or greater. Indicator species targeted by these stand conditions are swallow-tailed kite, cerulean warbler, northern parula and yellow-throated warbler. During leaf out, **mid-story** should be between 40 to 60 percent occupied by vegetation. Vines can be considered in this estimation. Mid-story starts at ten (10) feet and proceeds to the overstory. Birds that are targeted as indicator species utilizing the mid-story includes prothonotary warbler, yellow-billed cuckoo and the Acadian flycatcher. The understory is 3 - 10 feet in height and targets Swainson's, Kentucky and hooded warblers as indicator species. **Ground cover** is the most variable component and is dependent on the percentages in the three canopy layers and water amounts. Ground cover ranges from less than three (3) feet in height, with the foliage percentages around 20 to 50 percent of the total space available. Two birds that serve as indicator species for this layer are the American woodcock and the Swainson's warbler. Seventy percent of the stand needs vines present in all three canopy layers. Cane thickets should be present on 20 percent of the plots if the site is appropriate for cane (Hamel and Twedt, 2000). All four canopy layer percentages are by ocular estimation.

Review of 2000 forest inventory data (hardwood stands only) reveals that Pond Creek NWR has approximately 4,000 acres that fully meet all criteria previously presented and therefore would be considered in optimum condition. Twenty-six percent of the hardwood forest (some 3,200 acres) has basal areas that significantly exceed the recommended range of the 60 to 90 square feet. Not surprisingly, internal stand structure at most canopy layers fall below the minimums within these same stands. This implies that 26 percent of the refuge floodplain forest should have the basal area reduced through thinning actions immediately. The remainder of the existing hardwood habitat is at the lower end of the basal area spectrum or has optimum basal area and canopy occupancy levels but failed to meet the mid-story/understory canopy layer percentages. There are limited options that can be implemented on these areas. The most sensible one is to let the basal area increase over time and then re-evaluate the canopy layers.

Loblolly pine plantations account for 6,300 acres. These pine plantations are considered non-native in their existing monoculture condition and will be converted back to mixed species floodplain hardwoods through complete stand removal. Habitat values provided by these pine plantations for priority wildlife species is extremely limited. In other words, these stands impact the ability of this refuge to achieve the desired habitat conditions for priority species. Within some individual pine plantations that occur on higher elevations and terraces where pine does naturally occur as a stand component, minimal pine stocking (20-25 percent of the existing pine area predominately in five acre clumps) will be retained and will be managed to produce super emergent crowns. Bird biologists/scientists specifically made this recommendation following field trips to the area.

1. Remnant habitats

There are two communities on the refuge that will be removed from active forest habitat management through the duration of this plan. The first is approximately 250 acres of mature, mixed pine-hardwoods that are located on high terraces associated with the Little River in the eastern portion of the refuge. Due to its remoteness, this area was not subjected to the heavy best tree harvest cuts imposed on most of the refuge forest by the previous landowner. This area exhibits old growth forest characteristics with no sign of prior timber harvest impacts. The area contains some truly spectacular size trees (many in excess of 50" DBH). Several other small remnant areas (normally less than 20 - 30 acres in size) of this same community type are found scattered throughout the refuge and probably exist due to inaccessibility (such as being surrounded by drainage systems). These areas, in their current condition, provide excellent habitat conditions for canopy indicator species (swallow-tailed kites, etc.) due to significant numbers of super dominant stems (mostly old growth loblolly pine).

Several large depressional areas (a total of approximately 1,000 - 1,200 acres) exist in the northern and western fringe areas of the refuge and are forested with large cypress and associated wetland shrubs. These depressional areas typically contain surface water throughout the year except perhaps in the occasional severe drought year (e.g. 2001) when at least part of the area dries out. Apparently formed when sedimentation from nearby upland escarpments resulted in loss of drainage, these areas are unique at Pond Creek and receive heavy waterfowl and wading bird use. Several small colonial bird rookeries are scattered throughout these permanent water wetlands. It is within these areas that suitable habitat for pondberry is located. These sites will be excluded from active habitat management and protected from disturbance. Beaver activity is a threat to parts of these areas along with several elevated roadways which modify hydrology. Beaver dams have been removed annually since Service ownership and several elevated roadways constructed by previous landowners totally removed to protect these sites.

Previous owner (Weyerhaeuser) has an easement on a designated area of pine plantation, around 20 acres. This is a pine research site and will be excluded from active management during the life of this plan.

2. Habitat size and configuration

Previous sections of this plan provide detailed information on forest habitat types, size and configuration. The reader is referred specifically to Section B.1.a. **Baseline information.**

3. Connectivity

There is little fragmentation within the refuge forest since the entire area is forested with only minor breaks caused by relatively narrow primary refuge roads and water bodies. As previously stated, prior landowners established 6,300 acres of loblolly pine plantations. These plantations, varying in age from 10 - 35 years generally are present in relatively small stands ranging in size from 50 - 300 acres scattered throughout the refuge. These plantations are usually located on the higher elevations and along primary roads. In addition to the negative impacts detailed in other sections of this plan, these off site stands do cause some minor loss of connectivity within the hardwood forest community. As these stands are converted back to hardwood communities through total stand harvest, there will be short term impacts to connectivity due to the resulting large openings created. These impacts will be very short lived and exist only during the time period necessary for establishment of mixed species hardwood stands on these sites. The long term benefits to priority wildlife species far outweigh any short term negative impacts.

Commercial forest industry holdings join the refuge to the north and south and consist almost exclusively of pine plantations. Interspersed throughout these large forested holdings are small family farms which typically consist of pastures, home sites and relatively narrow strips of riparian vegetation along secondary stream courses. In particular, floodplain areas not in refuge ownership along the Little River and Cossatot River are almost completely cleared and in pasture or row crop production. The presence of these cleared lands results in loss of connectivity within the floodplain. Since both river systems contain listed species, potential impact exists for these resources caused by sedimentation.

Finally, Little River NWR is located in the Little River floodplain upstream from Pond Creek about 15 air miles. Privately owned, mostly pasture land or commercial pine plantations dominate the area separating the two refuges and virtually remove all connectivity between the two areas except for the Little River itself.

4. Habitat corridors

Within the refuge, habitat corridors are not an issue due to the entire area being forested. Land use changes outside the refuge ownership, particularly upstream as detailed above, has resulted in loss of connectivity with other high value habitats. U.S. Army Corps of Engineers flowage easements along virtually all stream systems in this region of the state that are associated with multiple large floodwater retarding reservoirs have maintained

minimal corridor connection to other public lands such as Millwood Reservoir, Howard County WMA and the Ouachita National Forest.

5. Edge habitats

The refuge on the whole has little traditional 'edge' habitat due to the contiguous forested communities. Primary edge habitats that effect neotropical birds are those of adjacent landowners. Pasture land, crop land, clearcuts, and "borrow" pits are examples of large scale open areas that create edge effect where connected to the refuge forest. Natural gas lines, electrical transmission lines and roads on the refuge create small linear edges that cross the refuge. Typical power line/gas line R-O-W's are 150 -200 feet in width while primary refuge road R-O-W's are normally 50 -75 feet wide. Forest stands immediately along these areas will be maintained at higher basal area limits to possibly reduce the potential for parasitism. Natural and man made edge habitats such as creeks, lakes and roads tend to be static and are not likely to change over the time period of this plan.

6. Buffer zones

A few SMZ's were implemented on the refuge under previous forest industry ownership and consist of narrow bands of mixed species hardwoods left along secondary tributaries during conversion to pine plantations. These areas will be of little long-term value since all of the pine plantations will be converted back to hardwoods. Streamside management zones along the Cossatot and Little Rivers will be a high priority under the direction of this plan to assure no potential negative impact to water quality. Water quality preservation is important for many reasons and in this refuge, particularly due to multiple listed species in these stream systems. In fact, a major concern for these listed species is pasturing and row cropping within the flood plain right up to top bank and the resulting potential increase for sedimentation. Several tracts of privately owned land within the refuge acquisition boundary are currently in this condition.

There are at least four known small rookeries located in depressional areas mostly forested with cypress and shrubs. SMZ's will be established around all such areas to protect them from disturbance. Actual harvest activities in the vicinity of these sites should be restricted from March - June to eliminate disturbance to nesting.

7. Natural dynamics of the system

Work by Runkle (1991) shows that natural disturbance on a landscape scale (10,000-100,000 acres) occurs at a relatively constant rate of one (1) percent a year across many different forest types. Disturbance adds greatly to the structure of forested wetlands across the landscape. Early explorers reported land condition's ranging from open forests of large trees and little understory to dense impenetrable thickets of small trees and vines. In the refuge, these relatively small-scale and temporally constant disturbances are discontinuously distributed across an already complex forested wetland mosaic. Forested

wetland ecosystems with intact natural processes do not proceed to a static climax condition or even a dynamic equilibrium; they exist in a fundamental state of disequilibrium and change.

More recently, 25-30 percent of the refuge has experienced heavy disturbance due to attempts to convert bottomland hardwood forests to pine plantations. These planted areas were ditched and drained and the plantations now exist in several different stages and conditions. Some have been flooded by beaver and the pine has died leaving open wetlands; others have been thinned and are growing rapidly while still others are dense impenetrable thickets of pine and sweetgum saplings. Most of the remaining hardwood forest was subjected to heavy harvest by diameter-limit, best tree cuts or high grading (Arkansas Natural Heritage Commission 1991). Consequently, the refuge forested wetland ecosystem is now skewed to a younger and more even age structure than existed historically. These management actions occurred across some 50 years of forest industry ownership and completion of major COE reservoirs on all stream systems. The existing forest exhibits many indications of these actions and reduced wildlife habitat productivity as a result. These recent silvicultural impacts, combined with the previously described changes in the area's hydrological regime, have changed and will continue to change the forested wetlands in the refuge. Over the long term, the forest composition on higher sites will change toward drier site species (white oaks, hickories, hollies) while lower elevations will move toward wetter site adapted species such as Nuttall's oak, overcup oak, cypress and riparian shrubs. These conditions and resulting changes across time will direct refuge stewardship and management actions implemented in the future.

C. Identify refuge habitat potential to contribute to the needs of those identified species, species groups and communities.

The refuge has great potential for providing desirable habitat for the priority species listed previously. The size of the refuge allows for stratification of areas that may provide habitat while other areas are cycling back to a desired condition. The pine plantations that will be converted back to a bottomland hardwood site will provide a younger aged forest for many years. These areas will be small compared to the whole refuge. The abundant water resources present and annual overbank flooding of the hardwood forest will provide habitat for wintering waterfowl.

IV. Habitat Objectives

The overall objective is to manage the bottomland hardwood forest community at Pond Creek NWR for priority wildlife, including T&E species, migratory birds and resident wildlife. Section C.2., **Identify habitat requirements**, presents detailed information concerning habitat requirements and specific quantified variables to achieve the desired conditions for meeting the needs of priority wildlife species. This information includes both general and specific objectives for desired conditions that will be considered in all management actions. A decision was made to leave this information in that section

since it is also directly related to habitat requirements. The reader is referred to that section and to the objectives established in the CCP that are presented below which details overall habitat objectives for this refuge.

The refuge CCP, developed with full public involvement, details the critical need to implement active habitat management. This document established four major goals designed to achieve the desired future conditions. It also presents specific objectives and strategies developed to achieve these goals. Objectives and strategies developed to achieve each of these goals and that are germane to the habitat management program are given below.

■ Restore and maintain diverse habitats designed to achieve refuge purposes and wildlife population objectives

* Manage 27,000 acres of refuge forests and waters to maintain viable populations of native flora and fauna consistent with sound biological principles and other objectives of this plan.

-Develop and implement a forest habitat management plan designed to maintain a diversity of forest cover types, tree species compositions and tree age class distributions.

* Maintain and manage approximately 20,000 acres of existing bottomland hardwood forests for a diversity of wildlife species, particularly waterfowl, wading birds and migratory forest [dwelling land] birds.

-Develop and implement management programs such as forest habitat management and water management to provide needed nesting, foraging and resting habitat.

-Implement forest management approaches that result in the maintenance and development of understory, midstory and overstory stand components (i.e. complex forest stand structure) to meet needs of forest dwelling non-game birds.

*Restore approximately 6,000 acres of bottomland hardwood forests and manage for a diversity of wildlife species, particularly waterfowl, wading birds and migratory forest [dwelling land] birds.

-Convert 6,000 acres of existing pine plantations to native bottomland hardwood forest as they become merchantable

through cutting and planting of hardwoods. Conversion will occur across a ten (10) - 15 year period.

- Maintain viable, diverse populations of native flora and fauna consistent with sound biological principles.

- *Maintain and/or enhance conditions (habitat, nesting areas, protection zones) as needed to meet the needs of threatened and endangered species.

- *Manage waterfowl in accordance with the NAWMP, focusing on [providing habitat needs for] target dabbling species including mallard, pintail, black duck, wood duck, and gadwall.

- * Manage for neotropical migratory birds, shorebirds and other nongame migratory birds. Partners in Flight Avifaunal Analysis for the West Gulf Coastal Plain and entry criteria utilized in the analysis establishes priority species suites and tentative breeding density targets for management priority at Pond Creek NWR.

- * Manage for resident wildlife species (e.g. white-tailed deer, turkey, raccoon, squirrel).

- Protect the area's wetlands and resource values through land protection strategies.

A. Scientific basis/rationale for development of habitat objectives

Habitat objectives and requirements presented above and Section C.2. are the culmination of efforts involving exhaustive input from the public and from science teams. The CCP process involved multiple, full scale public meetings and incorporated in-depth information from many Service and non-Service scientists, biologists, land managers and conservation organizations. The objectives developed from this process and presented above represent the best information available to direct the long-term management of the forest lands of this refuge within the constraints of refuge purposes, compatibility and Agency priorities. These objectives are incorporated into this document and served as the basis/foundation for development of specific habitat requirements and management approaches for priority species identified in the CCP. These specific habitat requirements reported in C.1 and C.2 above were developed by a multi-discipline, multi-Region team of refuge managers, foresters, biologists; Service Wildlife Habitat Management Division biologists, and forest bird research scientists from multiple agencies/organizations. Section C.2, pp. 18 provides a partial list of these bird biologists and scientists which collectively represents the leading authorities nationally on forest land bird biology and conservation in southern hardwood forests.

B. Reconcile conflicting habitat needs for resources of concern

In habitat management of forested ecosystems, the most common conflict occurs when unique habitat requirements of a specific T&E species provides less than optimum conditions for other priority species, even occasionally other T&E species. Recognizing and quantifying the level (degree) of this conflict frequently allows for modification of management actions to minimize negative impacts to another species or group of species. In floodplain hardwood forests, most such conflict revolves around eliminating or restricting the scope of active management actions on specific areas where a sensitive species occurs. If these restrictions involve significant (% of the total area available) and discreet limits to needed active management, overall level of conflict (e.g. trade-offs) elevates rapidly and management decisions must then be made on a continuum of least impact. At Pond Creek, preceding sections have described implementing SMZ's along all major river and stream courses to minimize the potential for off site sedimentation within these water bodies which contain T&E species. Furthermore, preceding sections detailed establishment of buffer zones (a form of SMZ's) around wet, depressional areas located principally along the western and northern fringes of refuge ownership to protect rookery sites and potential habitat for pondberry. Within these protection areas, long term habitat values for migratory birds and resident wildlife will undoubtedly be reduced due to the inability to implement needed management actions. Total area involved is less than one percent of the entire refuge forest and therefore should not result in a marked decrease in the ability to meet the habitat needs of migratory birds and resident wildlife. Beyond this instance, habitat needs of the priority species on this refuge and the management actions detailed in preceding sections to achieve optimum habitat conditions do not result in significant conflicts. Extensive experience in floodplain forest management has revealed that, as a rule, optimum forested habitat for waterfowl (mixed species stands with a good mast producing component, large crowned dominant and co-dominant crown class stems in mid to upper size and age classes, relatively low stand basal areas to perpetuate ground and understory vegetation, etc) virtually always provides excellent conditions for most forest land birds and resident wildlife. Little productivity to waterfowl is lost by retaining culls and old age class components while such actions add significant value for forest land birds and many species of resident wildlife. Mid-story components, a significant need for one group of forest land birds, within floodplain hardwood stands are frequently composed of high compositions of soft fruit producing species which waterfowl and resident wildlife use readily. In general, high quality habitat at Pond Creek for one group of priority species is also high quality habitat for the other priority species.

V. Habitat Management Strategies

A. Identify potential management strategies

Potential management alternatives considered during development of this plan are discussed in the following paragraph. The reader is referred to the Pond Creek Habitat Management Plan Environmental Assessment which provides an in-depth discussion of

the alternatives considered along with the environmental consequences of each alternative. (1) Active Forest Management with no Timber Sales - this alternative includes actions by the refuge staff only to address altered/degraded habitats through corrective treatments to restore hydrological processes (where practical); remove off-site, monoculture loblolly pine plantations established by previous owners and increase diversity and productivity of hardwood forests. Actions by the staff would include removing pine plantations by pushing with a crawler tractor or shearing, performing hydrology restoration activities by literally removing un-needed roads and pushing in dug canals, and using chemical tree injectors to address hardwood forest stand diversity needs. (2) Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Silvicultural Harvest Actions (Preferred Alternative) - implementation of this strategy would seek to restore altered/degraded habitats through use of customary Service timber sale procedures. This strategy would utilize silvicultural actions (individual tree selection techniques designed to create uneven age, highly diverse stands) based on site specific needs identified through review of current state of the art knowledge of priority wildlife species habitat requirements. This strategy would be implemented utilizing timber sales with special conditions incorporated to achieve needed restoration and would include gradual implementation of silvicultural actions across a 15 year entry cycle. Off-site pine plantations would be completely removed and converted to mixed species hardwood stands through release of existing advanced regeneration or planting of appropriate species. This approach is believed to be the most feasible and likely to have the best potential to restore significant percentages of habitat to regain forest diversity and habitat productivity necessary to achieve biological objectives. (3) Active Forest Management with Conversion of Pine Plantations and Implementing Even-Age, Silvicultural Harvest Applications - this alternative would provide a means to restore altered/degraded habitats through customary Service timber sale procedures. This approach is based on application of Silvicultural treatments, through commercial entity assistance, that develop even age stand conditions within forested habitats. This method relies upon using clear cuts as the preferred silvicultural technique. Application of this technique would be based on strict area control established through a 100 year rotation age with small clear cuts (20-100 acres) used to achieve uniform stands of similar habitat within the hardwood stands evenly distributed throughout the forest. Removal of pine plantations would be achieved as described in Alternative 2. Strict area control associated with even age management approach significantly reduces percentage of hardwood forest habitat that could be restored during the life of the proposed plan (8,000 - 9,000 acres). (4) Natural Succession (no Action) - this approach provides for no active silvicultural activities and relies upon natural successional processes. Altered/degraded habitat conditions generated through forest industry practices conducted prior to Service ownership would not be addressed through active management. Biological parameters identified as necessary to achieve optimum wildlife habitat conditions would exist on only a small percentage (1-5 percent) of forested habitats at any given time and be the result of events

such as storms, fires or disease outbreaks. Off-site, monoculture pine plantations would exist for 80 - 120 years significantly reducing habitat quality and negating obtaining mandated wildlife objectives.

B. Identify constraints associated with management strategies

Potential constraints associated with strategy (1) Active Forest Management with no Timber Sales include: (a) limited habitat improvement (100-150 acres) annually due to inadequate staffing and funding resources required to implement strategy; (b) minimal benefits to biological community due to scope; (c) loss of aesthetics due to prolonged existence of pine plantations and visibility of marketable timber being felled and left to rot; (d) failure to meet public concerns, legal mandates, refuge wildlife/habitat goals and objectives, and (e) minimal environmental impacts associated with staff conducted forest improvement activities such as disturbance, siltation, soil compaction, short term loss of forest connectivity etc.

Potential constraints associated with strategy (2) Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective silvicultural Harvest Actions include (a) modest increases in staffing and funding resources to administer customary Service timber sales; (b) minimal environmental impacts associated with silvicultural activities (i.e. disturbance, siltation, soil compaction, short term loss of forest connectivity etc.).

Potential constraints associated with strategy (3) Active Forest Management with Conversion of Pine Plantations and Implementing Even-Age, Silvicultural Harvest Applications include (a) minimal habitat improvement annually and reduced ability to maintain improvements made; (b) modest increases in staffing and funding resources to administer customary Service timber sales; (c) increased potential for environmental impacts associated with silvicultural activities (i.e. disturbance, siltation, soil compaction, short term loss of forest connectivity etc.); (d) moderate short-term loss of aesthetics due to clear cut management approach; (e) increased loss of forest connectivity; and (f) only partially addresses public concerns, legal mandates and refuge habitat/wildlife objectives.

Potential constraints associated with strategy (4) Natural Succession include (a) virtually no improvement in forest habitat conditions from current state; (b) long-term loss of aesthetics due to prolonged existence of pine plantations; and (c) failure to meet public concerns, legal mandates, refuge wildlife/habitat goals and objectives.

C. Identify the positive and negative impacts to fish, wildlife and plants associated with management strategy

Positive impacts that directly and indirectly affect fish, wildlife and plants associated with Strategy (1), Active Forest Management with no Timber Sales, include: reduced

soil acidity in areas planted to pine; some hydrology restoration; increased habitat productivity on areas where management treatments applied (estimated 2,250 acres over life of plan). **Negative impacts** include: prolonged existence of low productivity habitats on majority of habitats due to annual scope of management treatments possible; negligible to no wildlife population increases, minimal soil compaction, rutting, increased siltation and wildlife disturbance risks through equipment use; continued existence of reduced forest diversity and regeneration long-term. Negative impacts associated with equipment use will be short-term and minimized through consideration and biological planning.

Positive impacts that directly and indirectly affect fish, wildlife and plants associated with Strategy (2), Active Forest Management with Conversion of Pine Plantations and Implementing Uneven-age, Selective Harvest Actions, include: reduced soil acidity due to removal of off-site pine plantations; hydrology restoration; potentially increased habitat productivity due to management actions on most of refuge forest habitats during life of plan; significant wildlife benefits and greatest potential for population increases; increase in forest diversity and regeneration. This strategy provides the shortest time frame for realization of positive impacts. **Negative Impacts** include: minor soil compaction, rutting, siltation risks, disturbance to wildlife through silvicultural activities and equipment use. Negative impacts associated with silvicultural treatments will be short-term and minimized through consideration and biological planning.

Positive impacts that directly and indirectly affect fish, wildlife and plants associated with Strategy (3), Active Forest Management with Conversion of Pine Plantations and Implementing Even-age, Harvest Actions, include: reduced soil acidity due to removal of off-site pine plantations; hydrology restoration; increased habitat productivity in some hardwood stands where management treatments applied (8,000 - 9,000 acres over life of plan). **Negative impacts** include: prolonged existence of low productivity habitats on significant portion of the refuge forest; minimal to negligible wildlife population increases, minimal soil compaction, rutting, increased siltation and wildlife disturbance risks through equipment use; prolonged lack of forest diversity and regeneration, some loss of forest connectivity due to clear-cutting. Negative impacts associated with silvicultural treatments will be short-term and minimized through consideration and biological planning.

Positive impacts that directly and indirectly affect fish, wildlife and plants associated with Strategy (4), Natural Succession, include: no risk of disturbance to wildlife, siltation, rutting, soil compaction or loss of forest connectivity. **Negative impacts** include: perpetual existence of low productivity habitats on greater than 95 percent of forested habitats; soil acidity in pine plantations not corrected through restoration to native tree species thus contributing to reduced invertebrate life and higher pH levels in nearby aquatic habitats, minimal hydrology restoration, reduced wildlife population levels long-term, further reduction in forest diversity and regeneration.

D. Selected strategy implementation

The Active Forest Management with Conversion of Pine Plantations and implementing Uneven-age, Selective Silvicultural Harvest Actions, was selected as the preferred strategy. This strategy best meets the concerns addressed by the public concerning the management of habitats on Pond Creek NWR and habitat issues identified in previous planning documents (CCP, hunting plan, visitor services plan), meets legal mandates and will make the most significant contribution to accomplishing refuge wildlife/habitat objectives. The strategy has only minimal potential impacts on forest and cultural resources and is economically feasible. This approach will provide for maximum habitat productivity through silvicultural restoration and enhancement in an acceptable time-frame. The approach also provides a means for maintenance of habitat improvements long-term.

The following management strategies, the preferred alternative, are detailed in sections C.1 and C.2 of this document and are summarized below. The overall management strategy is to provide a bottomland hardwood community for a broad array of species that are listed throughout this document.

- Use commercial harvest operations to remove 6,300 acres of off-site loblolly pine plantations (over a 6-10 year time frame) by removing up to 1,200 acres per year, distributed over several compartments (see Table 3).
- Re-establish native hardwood species by planting (hand or machine) nursery grown seedlings on the converted pine plantations that do not have sufficient advanced regeneration of desirable hardwoods. This could be accomplished by including a stipulation in the timber harvest special use permit requiring the permittee to re-establish native hardwoods as a "conditions of sale". The cost would be absorbed into the price of the timber and not directly incurred by the service.
- Leave scattered, five (5) acre clumps of loblolly pine on high terraces and natural stream fronts (local land forms that historically contained a component of loblolly pine) for potential swallow-tailed kite nesting sites at a rate of four (4) to five (5) clumps per 100 acres if available.
- Use commercial timber harvest conditions to effect small ($\frac{1}{2}$ to one (1) acre) regeneration openings (removing all merchantable stems) at a rate of one opening per ten (10) acres for each entry cycle, and to thin the overstory and mid-story trees to attain the desired effects (overstory, mid-story, understory, and ground cover percentages as expressed in Sec. C. 2) for migratory birds and resident wildlife.
- Utilize chemical and/or mechanical methods to control understory/mid-story species (i.e., American holly, hornbeam, etc.) to promote vertical diversity.

Utilize timber harvest "conditions of sale" clauses requiring reduction of these species in conjunction with the timber sale to minimize cost.

- Establish SMZ's as described in the document "Arkansas Forestry Best Management Practices for Water Quality Protection", to protect water quality, provide potential habitat for the Rafinesque's big-eared bat, provide aesthetically pleasing opportunities for the public, and to provide another habitat condition (higher basal area and reduced mid-story, understory, and ground cover) thus enhancing diversity. These SMZ's will also double as buffer zones around colonial bird rookeries.

- Protection (from silvicultural activities) of approximately 250 acres of late serial stage flora (Compartment 1, Stand1) east of state highway 71, consisting of some very large hardwood trees and loblolly pine. This area will serve as a demonstration area, provide aesthetic relief and provide habitat for species that prosper in a late serial stage setting.

- Provide areas of permanent and semi-permanent water in and along streams (Pond Creek and Burkes Slough, etc.) lined with cypress and water tupelo trees, old stream meanders/oxbow lakes with scattered cypress and water tupelo and wetland scrub shrub areas or "beaver ponds" usually with a significant component of buttonbush. There are also some of these areas that are open and more representative of a marsh or wetland grass habitat. All of these areas provides habitat for a myriad of wetland species including warm water fishes, the American alligator, waterfowl, wading birds, frogs, snakes, salamanders, etc.

- Promote development of switch cane on suitable sites through the use of silvicultural techniques such as reduction of tree basal areas through commercial timber harvest, allowing sunlight to penetrate to the forest floor, a major factor in promoting switch cane.

- To achieve the objective of providing an array of hard and soft mast of as many types of forage, directly and indirectly, for an extremely diverse cadre of fauna adjust species composition, through the use of commercial timber harvest when possible, to maintain a component no greater than 50 - 60% (# of stems) of any one species or genus.

E. Program policies and administrative control

1. Fish and Wildlife Service policy

Section 6 RM 3.2 of the Refuge Manual states, "The policy of the Service is to manage forests in a manner that best meets the overall objectives of a particular refuge." Pond Creek NWR's forest habitat management program will adhere to the approved procedures, principles, and techniques listed in the Refuge Manual and Refuge CCP.

2. Policy of harvest

The application of forest management practices must be consistent with available funds and manpower. Most forest management practices on the refuge can be accomplished by commercial harvests, which prove to be cost effective as well as manpower efficient. Commercial harvesting will be used when it is an effective means of achieving refuge objectives, and when timber volumes are sufficient to make a commercial operation feasible. General restrictions and regulations that apply to commercial harvest operations may be found in Appendix E, Conditions Applicable to Timber Harvest Permit. When commercial operations are not feasible, refuge personnel, contractors, and youth program enrollees, approved volunteers, or educational institutions under cooperative agreements may administer forest habitat improvement treatments.

3. Control records

The following process will be adhered to before application of any silvicultural treatments. First, stands will be inventoried in a uniform manner to evaluate habitat conditions as they apply to the objectives of the refuge. Next, inventory data will be evaluated and a determination made as to the best course of action to accomplish the habitat objectives. Finally, regional office approval will be necessary before any treatment is applied to the stand. All original documents pertaining to the stand treatment i.e., inventory data, prescriptions, approvals, volumes removed, contracts, etc. will be kept in the refuge office files.

4. Compartment prescription

As related earlier in Sec. B. 1. a., **Baseline information**, the refuge has been divided into eight (8) compartments and will be evaluated on a 15-year cycle as follows unless habitat needs of an area dictate early or immediate action. Entry cycles for the pine plantations are a high priority according to the objectives of the Pond Creek NWR CCP. Entry for pine plantation and hardwood compartments are shown below. Since much of the plantations are grouped together by age classes and dispersed throughout seven (7) compartments, the prescription cycle was developed by merchantability and by spreading out over the geographical location. Table 3 provides compartment and stands cycles for the pine plantations to provide more detailed information. This decreases the concentration of regeneration cuts in the same locale for an entry cycle of a given year.

Table 2. Compartment Prescription Cycle

Year	Compartment(s)		Forest Acreage
	Hardwoods Comp./Stand	Comp. with Pine Plantations	
2004	7 / 1, 2 & 3	3, 4, 5 & 7	1,682
2005	7 / 4, 5, 6, 7 & 8	3, 4, 5, 6 & 7	1,916
2006	5 / 1, 2 & 3	3, 4, 5 & 7	2,871

2007	5 / 4, 5, 6 & 7	2, 3, 4, 5, 6, & 8	2,635
2008	4 / 1, 2 & 6	3, 4 & 5	1,668
2009	4 / 3, 4 & 5	3, 4, 5 & 6	1,442
2010	6 / 1, 2, 3 & 5	4 & 5	2,288
2011	6 / 4, 6, 7 & 8		1,427
2012	1 / 1, 2, 3, 4 & 5		1,263
2013	1 / 6, 7, 8, 9 & 10		1,455
2014	8 / 1-5		2,013
2015	2 / 1, 2 & 3		1,278
2016	2 / 4 & 5		648
2017	3 / 1, 2, 3, & 4		1,176
2018	3 / 5, 6, 7 & 8		1,084

Table 3. Compartment Prescription Cycle for Pine Plantations

Year	Comp # / Stand #	Acres	Total for year
2004	3/10	147	
	4/19	170	
	5/16	165	
	5/19	130	
	7/12	179	
	7/15	73	
	7/17	232	
			1,096
2005	3/15	98	
	4/16	150	
	4/17	18	
	5/15	309	
	6/12	106	

	7/14	92	
	7/16	90	
	7/18	118	
			981
Year	Comp # / Stand #	Acres	Total for year
2006	3/14	76	
	3/16	191	
	4/09	40	
	4/10	158	
	5/11	216	
	7/19	463	
			1,144
2007	2/06	192	
	3/12	74	
	4/15	134	
	4/12	112	
	5/13	205	
	5/18	52	
	6/13	40	
	8/07	192	
			1,001
2008	3/17	161	
	3/13	132	
	4/18	145	
	4/20	133	
	5/20	324	
			895
2009	3/11	86	

	4/14	372	
	5/14	64	
	5/17	21	
	6/11	159	
			702
Year	Comp # / Stand #	Acres	Total for year
2010	4/11	15	
	4/13	45	
	4/19	268	
	5/12	108	
			436

In ten years, the pine plantations should be successfully removed. If events progress rapidly, the pine plantation conversions may be completed in as soon as eight years.

The compartment prescription procedure will be to delineate stands within the featured compartment or compartments of the corresponding year. Stands should be limited in size so that application of treatments can be accomplished in one season or period of time. Stand boundaries should follow distinct or recognizable features on the ground and should encompass similar habitat in order to facilitate expediency in management applications.

Each stand will then be systematically inventoried with respect to refuge habitat objectives. At a minimum, inventory designs will incorporate timber volumes, measurements of habitat structure, and measurements of stand development i.e., regeneration and stand succession (see data collection sheet, Appendix A). Timber cruise, habitat data and detailed maps will be kept on file by stand and compartment in the refuge office. The results will be evaluated and a prescription detailed by a team consisting of the Refuge Forester, Refuge Wildlife Biologist, and Refuge Manager. The prescription will evaluate the results of the inventory, and if any action is necessary, describe in detail the specific treatment(s) that would best accomplish the refuge objectives of forest habitat management.

After approval, prescriptions will be implemented, and results monitored, both vegetative and avian. Ocular observations and permanent bird plots will be used to evaluate avian use and habitat conditions for the stand. Vegetative analysis for bird plots

will be updated as changes are perceived. Bird plot monitoring, forest prescriptions and documentation for the stands will be kept on the file.

5. Archeological and cultural resource management

As stated before in this document, there are 14 identified cultural resource sites on Pond Creek NWR. Consisting exclusively of Native American sites, these areas are located on refuge maps and will have full protection as provided by ARPA. There are no National Register sites present. Approximate UTM locations for the sites have been obtained. These sites will be located and protected before any silviculture activities are performed.

When a compartment comes under consideration for treatment, known archeological sites and cultural resources that are identified in or near the treatment area will be noted and a list sent to the Service's Regional archeologist. Review of the sites and resources will be performed by this person and clearance obtained from the SHPO. Upon completion of all clearances, treatment will be implemented with an appropriate buffer established around the perimeter of the site.

6. Aesthetics

Aesthetics are an important concern for forest habitat managers. Thousands of visitors use the refuge every year for hunting, fishing, wildlife observation, or other compatible wildlife-oriented recreation. In application of all forest habitat treatments, consideration must be given to the fact that these habitats are to be managed "for the benefit of present and future generations of Americans"(Refuge Improvement Act of 1997). While the intentions of this management plan are to fulfill this obligation, it must be realized that some silvicultural treatments may not readily appeal to some visitors. Therefore, buffer strips will be established along watercourses and some major roadways. Silvicultural applications will be minimized in these areas to provide an aesthetically pleasing forest to visitors. Buffer strips along roads will not be implemented during conversion of pine plantations.

F. Policy and administration of sales

Desired forest habitat manipulation can often be facilitated by use of carefully implemented commercial sales. All timber sales will be conducted in accordance with the requirements listed in the Refuge Manual (5 RM 17 and 6 RM 3), guidelines established in this plan, and specifications detailed in the compartment prescriptions. Timber sales will be specifically designed to meet the refuge forest habitat management objectives.

1. Timber marking procedures

For application of treatments when it is necessary to designate trees to be left or cut in a given stand, designated trees will be marked with vivid blue paint (or another appropriate color that does not conflict with boundary marking color, etc.) one spot

above the high water mark or at eye level if possible, also two marks on the stump of the tree, near the ground, on opposite sides. Paint spots should face a universal direction in a given sale unit to facilitate harvest operations. Paint used should be colorfast for two years. Specific marking directions will be included in all applicable prescriptions.

2. Sale appraisal

Appraisal of forest products for each commercial sale will be kept on file at the refuge. Consideration will be given to volume, species, and grade of products removed. Also factors such as logging costs, or special conditions of the contract will be considered. This information will be used to ensure the Fish and Wildlife Service receives the fair market value for timber products removed the refuge.

3. Bid invitations

Small sales (estimated receipts less than \$2,500) will be negotiated. The Refuge Forester will make a reasonable effort to obtain at least three bids from potential buyers. These bids will be documented and a permit will be issued to the successful high bidder.

Larger timber sales (estimated receipts more than \$2,500) will be conducted through a formal bid procedure or will be negotiated. Invitations to bid will be prepared and administered by refuge personnel. Formal bid invitations will be mailed to all prospective bidders, see Appendix F. Bid invitations will contain the following information:

- 1) A Formal Bid Information Form containing sales information .
- 2) A notice to bidder form, which the bidder fills out, signs, and returns to the refuge (Appendix G).
- 3) Timber sale volume information.
- 4) Maps detailing all sale units.
- 5) Conditions applicable to timber harvesting permit.
- 6) Certificate of Independent Price Determination.
- 7) Equal Employment Opportunity Clause (Form 3-176).
- 8) Show me trip information if applicable.

4. Bids and performance deposits

For all bid sales, a bid opening date and time will be set to occur at the refuge headquarters. All bids received prior to the opening time will be kept, unopened and locked in the refuge cashier's safe until the specified opening time. Any bids received after the specified opening time will not be accepted. The refuge retains the right to reject any and all incomplete or otherwise unacceptable bids.

A \$500 bid guarantee must accompany all bids received through the formal bid process. This deposit is to ensure the sincerity of the bidder's intention to purchase the offered sale at the bid price. In the event the successful bidder chooses not to purchase the offered timber, the bid deposit will be forfeited to the government. When the successful bidder is named, all unsuccessful bidders' deposits will be immediately returned. The

successful bidder's deposit will be returned when a performance guarantee is submitted. The performance guarantee is a deposit of ten percent of the estimated value of the sale up to a maximum of \$20,000 and must be received before any activities proceed. Depending on the size of the sale or potential for damage, more than ten percent of the appraised value may be justified as a deposit; the amount of the deposit will be stipulated in the bid invitation. The performance guarantee will be retained by the government in a holding account to cover any damages caused by the successful bidder, their agents, employees, or their producers. The balance of the deposit will be refunded to the successful bidder when the sale is completed.

Small sales made through the negotiation process will also require a performance guarantee deposit to be received by the government prior to any timber harvest.

5. Harvesting permit

Upon selection of a successful bidder by the Refuge Manager, a harvesting permit will be issued. The harvesting permits will include the following:

- 1) Special Use Permit - All information required on a special use permit will be complete, including information applicable to the specific sale (i.e., methods and amounts of payments).
- 2) Maps locating all sale units.
- 3) A copy of the Conditions of Sale applicable to timber harvesting.

6. Payment for forest products and administration of receipts

In the case of lump sum sales the successful bidder (hereafter referred to as the permittee) will have ten (10) days after receipt of the harvesting permit to make total payment or in the event of a consumer scale sale, (pay as cut) the performance guarantee will be considered as prepayment for the first two week (or less) operating period; however, at the end of the first operating period and after each subsequent operating period, payment will be made to the government in the amount indicated by actual scale tickets for that period. In no case will harvesting operations begin prior to payment. The purpose of an advance payment is to encourage the permittee to begin harvesting operations as quickly as possible and is department policy. All payments will be in the form of a registered check, Cashier's Check, or money order payable to U.S. Fish and Wildlife Service.

In some cases, such as salvage sales, where speed is essential and volumes are difficult to determine, timber products may be sold by mill scale. That is, the products will be sold according to the volume of products delivered to a mill, as scaled by that mill. In mill scale sales, payment will be made according to the units scaled at a negotiated price per unit. Payments will be made on a time schedule specified on the Special Use Permit. All payments will be accompanied by mill scale tickets or other documentation confirming the volume of forest products removed from the refuge.

Volumes and receipts will be properly recorded and filed for various refuge reports. Receipts for forest products, along with proper documentation, will be forwarded to the Fish and Wildlife Service Finance Center. Any receipts, which cannot be processed the same day received, will be stored in the refuge cashiers safe until processing can be completed.

7. Administration of harvesting operations

In order to confirm harvest procedures and address any questions, a meeting will be held prior to entry between the Refuge Forester and the permittee. The permittee will be required to notify the refuge staff prior to initiating harvesting operations and upon completion.

Close inspection and supervision of all timber sales is necessary to ensure that harvesting operations meet the conditions of the permit and refuge objectives. Frequent inspections of harvesting operations will ensure that only designated trees are cut, and that problems are rectified before becoming major issues. Timber harvesting operations may be suspended or restricted any time that continued operation might cause excessive damage to the forest stands, soil, or wildlife habitat. Reasons for suspension or restriction may include, but are not limited to: excessive disturbance to wildlife during breeding, nesting, or young rearing season, periods of high wildfire, insect, or disease hazard, times when harvesting activities may interfere with essential refuge operations, during periods of heavy rains or wet conditions which may cause soil rutting, erosion or flooding, or when harvesting operations present a safety hazard. In general, harvest activities will not be conducted January-May due to wet ground conditions and to minimize disturbance to nesting birds.

When harvesting is complete, the Refuge Forester will inspect the site for compliance with all requirements of the contract. If any deficiencies are found, the permittee will be notified and given reasonable time to achieve compliance. If full compliance is achieved, the permittee's performance deposit will be returned in full. If not, an amount to mitigate damages will be deducted from the performance deposit and the remaining amount returned.

G. Scope of forest program

The forest habitat management program on Pond Creek NWR is designed to produce or maintain the desired wildlife habitat, focusing on T & E species, migratory forest birds and resident wildlife in general. As long as commercial harvesting activities can be adapted to meet refuge objectives they will be utilized to produce the desired habitat. Eventually management will work towards a goal of minimal need for harvesting activities and other silvicultural treatments.

The cost to the refuge associated with commercial activities, in terms of manpower and funding, is much lower than noncommercial treatments. However, noncommercial activities will be utilized when commercial activities cannot meet refuge objectives.

H. Program units – habitat management compartments

All property of Pond Creek NWR has been divided into 8 compartments. Compartment boundaries follow distinct lines that can be easily identified in the field, i.e., streams, roads, trails, etc. Compartment evaluation will follow a 15-year cycle; inventorying approximately 1,820 acres per year. Upon inventory each stand will be evaluated through the prescription process. This management system will balance the workload from year to year, concentrate the work area, limit the area to be inventoried each year, and reduce the time between inventory and application of recommendations.

All record of inventories, stand boundaries, sales, etc. will be kept on file, organized by compartment, in the refuge office.

I. Physical plant and equipment use requirements

Access can be gained to the refuge in numerous places from state or county maintained roads or highways. Additionally, the refuge maintains approximately 28 miles of improved roads to access two (2) major refuge tracts. Most large forested stands on the refuge have good road access, however, there are locations where access may be limited to crossing private property. In these situations, access for forest habitat management will necessitate permission from private landowners.

There are not any plans for the refuge to fund construction of new roads specifically for the habitat management program. Improvement and rehabilitation of primary roads for multiple uses on the refuge continues through the Maintenance Management System, Refuge Operation Needs System, and the refuge-operating budget. Improvement of necessary roads for management needs will be accomplished on a stand by stand basis as habitat management treatments are rendered; this will be accomplished by the timber contractor as part of the timber sale permit whenever possible. Additionally, commercial timber contractors will be required to repair any damage to roads that result from their operations. All roads will be approved in advance by the Refuge Manager and built to specifications provided by Fish and Wildlife Service staff. Before logging roads are reactivated or constructed they will be evaluated for environmental impacts. The construction and maintenance of logging roads will follow the Best Management Practices listed in The Arkansas Forestry Commission's publication "Best Management Practice Guidelines for Silviculture". When logging activity has ceased, temporary roads will be closed after reshaping to ground elevations and restoring all drainage capacities.

Currently, there is not a need for Engineering services to help implement the refuge's forest habitat management program. Engineering services will be requested if there is a need for any construction or maintenance project relating to this program.

J. Miscellaneous equipment

There is currently no forestry equipment at Pond Creek NWR. Equipment needs and cost for implementing the forest management plan are listed below.

Table 4. Forest Management Program Equipment

	Item	Unit	Cost	Total Amount
1	4-Wheel Drive Pickup	3	\$25,000	\$75,000
2	4-Wheel Drive ATV	3	\$5,000	\$15,000
3	Trailer	2	\$1000	\$2000
4	Nelson Paint Gun	6	\$125	\$750
5	Global Positioning System Unit	2	\$2,000	\$4,000
6	Office Computer	2	\$3,500	\$7,000
7	36-inch Printer	1	\$5,000	\$5,000
8	Inventory Software	1	\$1,000	\$1,000
9	Geographic Information Software	1	\$1,500	\$1,500
				\$111,250

Other equipment such as boats with outboard motors, additional trucks, trailers, all terrain vehicles (ATV's), chainsaws, and safety equipment are available from the refuge. Numerous small items such as compasses, prisms, diameter tapes, increment borers, fire safety equipment, etc., are additional small items for use in the forestry program.

K. Manpower and funding requirements

Current staffing at Pond Creek NWR consists of a refuge manager, a biological technical and an engineer equipment operator. There is no forest management staff. Most forest management needs are conducted by the staff at Felsenthal NWR since the refuges are in the same Complex. Management of the forest habitat to meet the objectives under this plan will require additional staff and equipment. The following table presents the annual staff requirements to implement forest management on Pond Creek NWR.

Table 5. Staffing Requirements

Staff Position	Forest Staff Days
Refuge Manager	10
Forester	260
Forestry Technician	260
Refuge Biologist	50
Biological Technician	130
Equipment Operator	20
Refuge Law Enforcement Officer	10
Clerical Staff	40

The following table is a breakdown of anticipated duties for each position.

Table 6. Staff Days by Duties and Position

Staff Position	Administration	Inventories	Prescriptions	Treatments	Pest Management	Boundary Marking	Miscellaneous	Leave	Total
Refuge Manager	10								10
Forester	20	50	30	50	30	10	30	40	260
Forestry Technician		50		60	40	40	30	40	260
Refuge Biologist		15	15	15			5		50
Biological Technician		25		25	25	40	15		130
Equipment Operator				20					20
Law Enforcement				5		5			10
Clerical Staff	5	30					5		40

A total of 780 annual staff days are needed to accomplish the activities in the habitat objectives. The forester, biologist and forestry technician are essential staffing additions needed to fully implement forest habitat management on Pond Creek NWR. Annual funding needs are summarized as follows.

Table 7. Forestry Program Funding Needs

Description	Cost
Salaries	300,000
Equipment & Maintenance	100,000
Forest Habitat Improvement	20,000
Operating Expenses	60,000
Total Annual Cost	480,000

Salary cost is prorated for all staff positions identified in the previous table. Equipment and maintenance costs include the purchase of new 4-wheel drive trucks, ATV's, and other purchases of forestry supplies, including computers, etc. Forest habitat management expenses involve funding of any non-commercial treatments or other forestry operations, or improvement of roads for forestry management. Operating expenses include purchase of fuel, high explosives for beaver dam removal, marking paint, computers, office supplies, etc.

L. Documentation of compliance

All timber sales will be conducted in accordance with the requirements listed in the Refuge Manual (5 RM 17 and 6 RM 3), guidelines established in this plan, and specifications detailed in the compartment prescriptions. Timber sales will be specifically designed to meet the refuge forest habitat management objectives. Before a silviculture prescription is implemented on the refuge, several issues need to be addressed. An Service intra-section 7 form, Clean Water Act Section 404 silvicultural exemption concurrence and Arkansas State Archeological Permit all need to be obtained, completed and approved before any activities are implemented.

VI. Monitoring and Evaluation by Objective

Monitoring and evaluating the progress of each of the habitat objectives on the refuge for one of the eight compartments will be performed on an annual basis. A two and half (2

1/2) percent forest inventory cruise will be conducted on the compartment that is being evaluated. Each objective will be evaluated by the refuge manager, forester, wildlife biologist and treatments prescribed, if needed. Compartments that are not under evaluation will still be monitored by ocular observations for changes that appear abnormal. Bird point counts at some 45 locations throughout the forest will be monitored annually and forest bird utilization evaluated for response to management actions implemented. Virtually any silvicultural treatment would have one or more point counts falling inside the treatment location. Bird utilization data collected annually at the point location would be used to evaluate silvicultural treatment responses. During silviculture treatments, 12 points will be systematically added if the treatment area is adequate in size. Six (6) points will be placed in the treatment area and six points lie in a surrounding control. Each point should be surveyed two-three (2-3) times a year within breeding season. Surveys should be conducted one year in advance of treatment and then at year one (1), two (2), and five (5) post-harvest.

Removal and conversion of the pine plantations to a hardwood community will be an ongoing event for about ten years. Once the conversion is completed, the sites will be monitored and evaluated for vigor and number of seedlings per acre. Monitoring and evaluating wildlife use in these areas will be performed by the wildlife biologist.

VII. Annual Habitat Work Plans

At this point in preparing the habitat management plan, it would be noteworthy to state that a freezing rain fell in mid to late December 2000 and the frozen rain stayed attached to the trees and forest structures until mid January 2001. This event will be referred to as the ice storm of 2000-2001. Much of southwest Arkansas experienced this ice storm. Sevier and Little River Counties were no exception. Tree crowns stressed with the frozen precipitation began to give way, with limbs and even their boles snapping and falling to the frozen ground. Some trees have different physiological characteristics and choose to bend before breaking. This left many R.O.W.'s of roads, power lines and other such openings with numerous trees overturned in them. Nearly all the roads on the refuges were impassable and the rural electricity was off for much of the two counties due to ice forming on trees and powerlines.

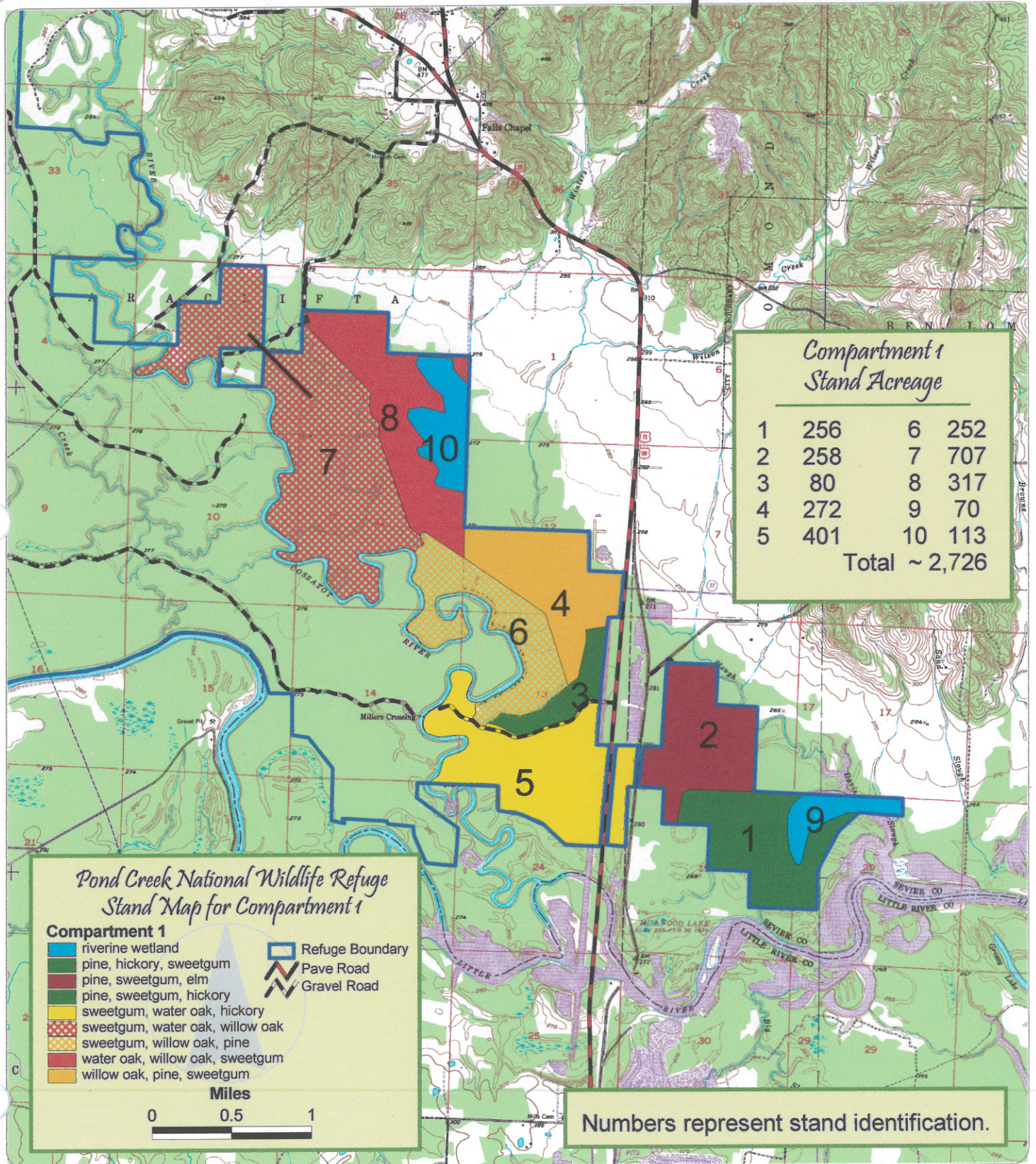
Due to the ice storm, the refuge has sustained a great deal of change since the forest inventory that was performed in May 2000. Overstory, mid-story and understory percentages have been affected or soon will be affected since portions of the crowns and in some cases the whole crown has been removed from the overstory. Ground cover and understory percentages should increase with the increase in sunlight coming through the canopy gaps in the overstory and mid-story. Overstory percentages have decreased with a smaller change in percentages noticed in the mid-story.

By ocular estimations, the basal area has changed in some areas but not significantly. The real change is in the crowns of the trees. White oak, hickory and sweetgum crowns seem to have withstood the ice with minimum damage while the red oak species lost significant portions of their crowns. Willow oak was hit the hardest with nearly every tree losing anywhere from 50 to 75 percent of its crown. Loblolly pine plantations were no exception. Their needles gave more surface area for the freezing moisture to adhere to. Limbs were ripped off while some tops snapped and fell due to the excessive weight of the ice.

Although habitat conditions have changed since inventory data collection, these changes are not germane to implementing the program outlined in this plan as the preferred alternative. Decisions to treat a particular stand with silvicultural actions will be based solely upon data collected during entry level inventories and conditions of each stand in relation to the needed habitat parameters detailed in Sections C. 2., e.g. priority species habitat conditions at the time of entry. Compartment summary data presented in the following sections is not intended for silvicultural action decision making but is critical for management plan development and describing the forest community.

Compartment Maps & Summaries

Compartment 1 Stand Map



Date: 04/02/2001COMPARTMENT SUMMARY
by STANDTreatment Year 01Refuge Pond Creek State AR County Sevier Compartment 1

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		pine, hickory, sweetgum		256	48/47	1952	102		
2		pine, sweetgum, elm		258	53/33	1947	65		
3		pine, sweetgum, hickory		80	40/38	1960	22		
4		sweetgum, willow oak, pine		272	49/17	1951	61		
5		sweetgum, water oak, hickory		401	78/41	1922	73		
6		sweetgum, willow oak, pine		252	39/36	1961	72		
7		sweetgum, water oak, willow oak		707	40/32	1960	74		
8		water oak, willow oak, sweetgum		317	56/28	1944	69		
9		riverine wetland		70					

Date: 04 / 02 / 2001

COMPARTMENT SUMMARY

by STAND

Treatment Year_01_____

Refuge_PondCreek_____State_AR_____County_Sevier_____Compartment_1_____

[illegible]

**Overstory / Midstory*

Summary of Acreage:

Water area 183

Special R.O.W. _____

Road Acreage 7

Managed Forested Land 2536

Non-Managed Forested Land _____

Non Forested Land _____

Wildlife Openings

Total Compartment Acres 2726

Compartment 1

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	80	53	39	41	66	87	73	87	44	102
2	51	53	56	42	54	86	82	91	33	65
3	14	38	96	60	0	100	100	75	19	23
4	74	51	39	70	78	94	89	67	39	61
5	74	70	51	48	68	94	84	94	39	73
6	77	58	37	34	60	100	90	80	42	72
7	58	39	14	30	49	88	88	88	42	75
8	70	50	24	51	57	81	81	71	46	69

Four parameters for determination of suitable habitat.

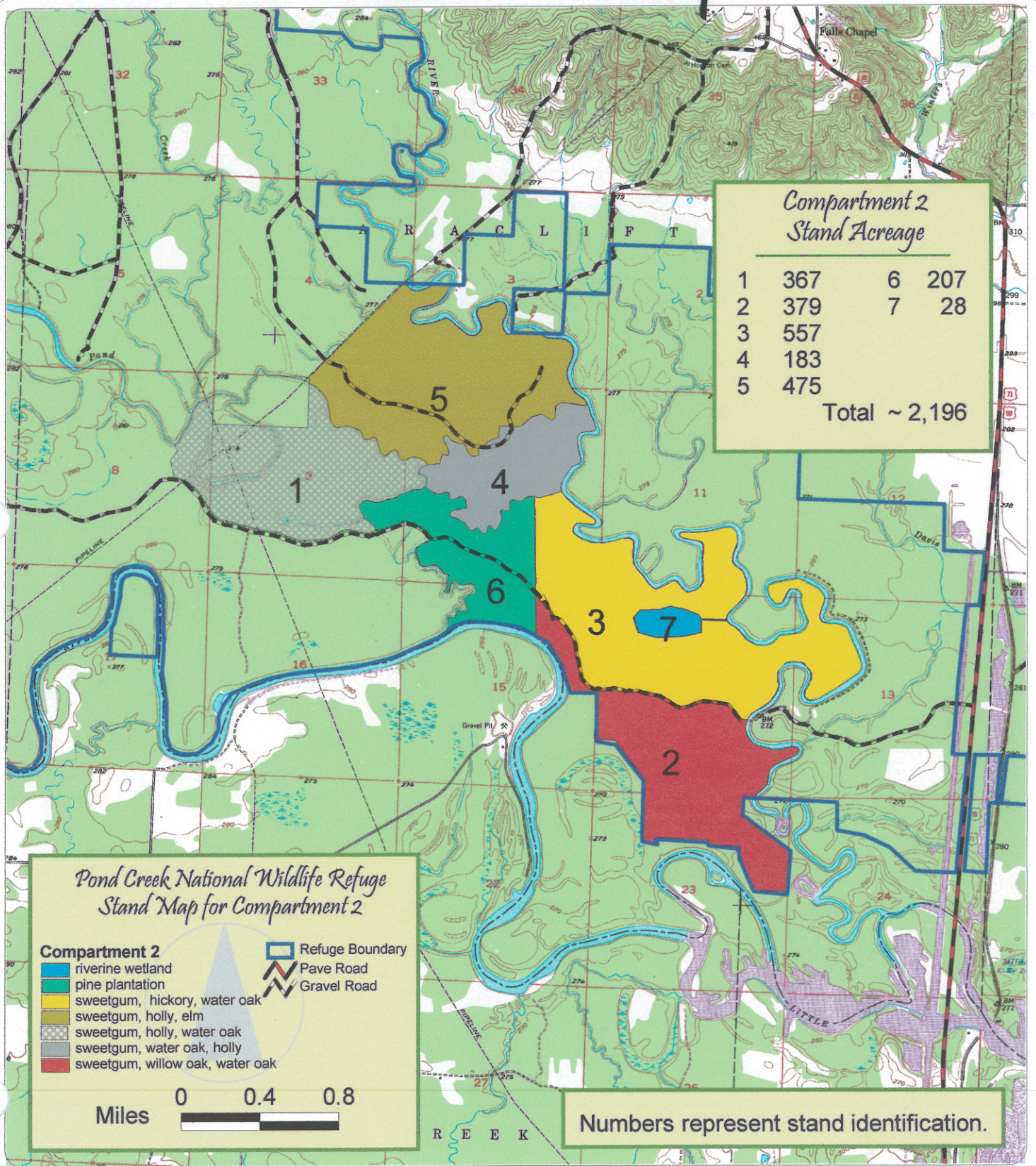
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 2 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 2

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		sweetgum, holly, water oak		367	57/39	1943	75		
2		sweetgum, willow oak, water oak		379	58/42	1942	60		
3		sweetgum, hickory, water oak		557	51/36	1949	44		
4		sweetgum, water oak, holly		183	76/53	1924	65		
5		sweetgum, holly, elm		475	69/26	1931	56		
6		Pine		207	18	1982	90		
7		riverine wetland		28					

* Overstory/Midstory

Summary of Acreage:

Water area 28
Special R.O.W. 6
Road Acreage 20

Managed Forested Land 2142
Non-Managed Forested Land
Non Forested Land

Wildlife Openings
Total Compartment Acres 2196

Compartment 2

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	44	40	37	28	30	67	74	67	34	84
2	48	47	38	21	79	84	84	63	41	72
3	33	34	53	20	37	52	70	66	31	53
4	52	73	30	44	57	86	29	0	39	66
5	43	74	52	38	54	83	75	46	36	58

Four parameters for determination of suitable habitat.

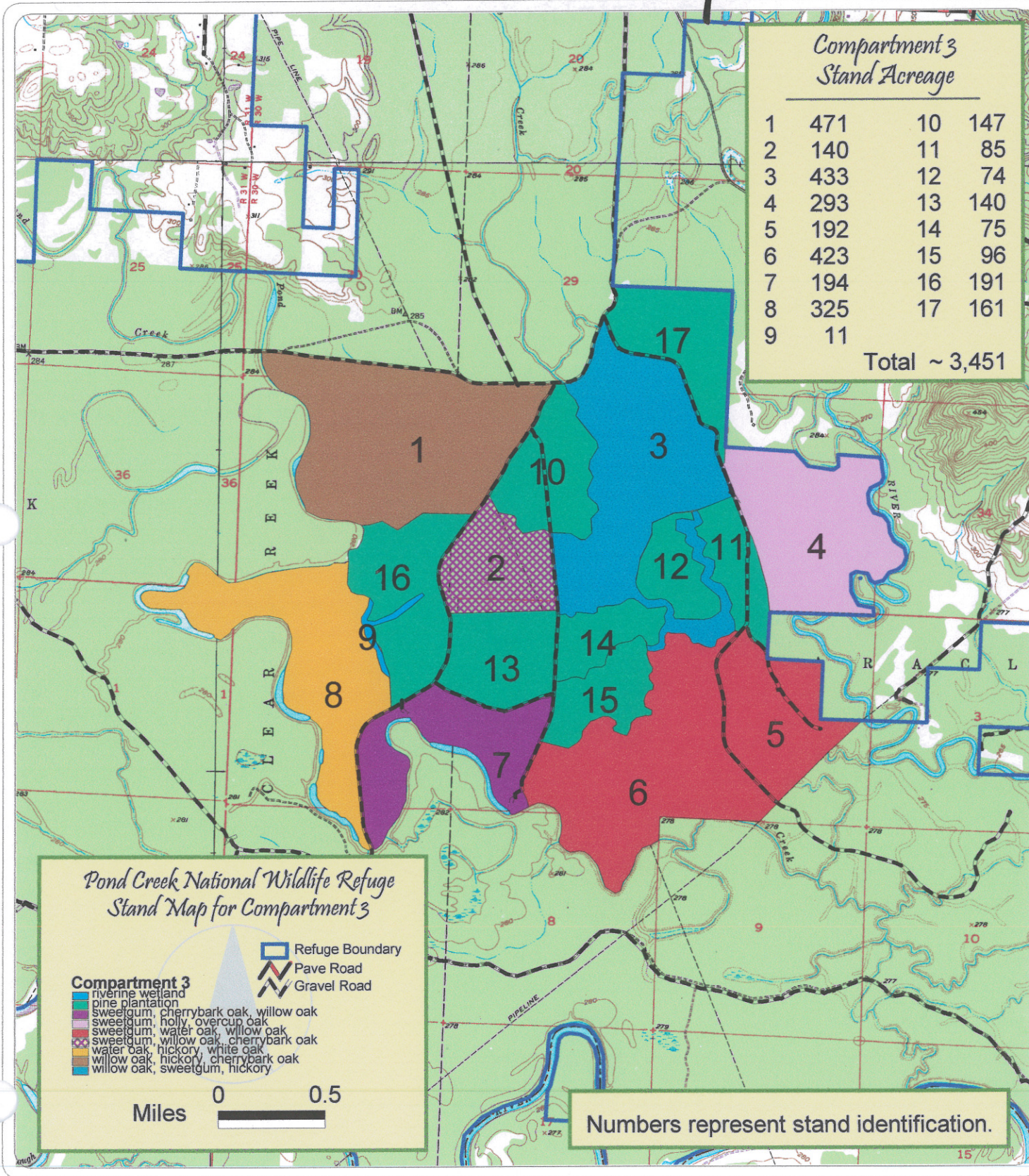
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 3 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 3

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		willow oak, hickory, cherrybark oak		471	74/17	19	63		
2		sweetgum, willow oak, cherrybark oak		140	50/26	19	76		
3		willow oak, sweetgum, hickory		433	57/34	19	58		
4		sweetgum, holly, willow oak		293	39/28	19	73		
5		sweetgum, water oak, willow oak		192	49/47	19	66		
6		sweetgum, water oak, willow oak		423	44/35	19	59		
7		sweetgum, willow oak, cherrybark oak		194	65/23	19	72		
8		water oak, hickory white oak		325	77/19	19	63		
9		riverine wetland		11					

* Overstory/Midstory

Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 3

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
10		Pine		147	23	1977	80		
11		Pine		85	13	1987	130		
12		Pine		74	13	1987	130		
13		Pine		140	13	1987	130		
14		Pine		75	18	1982	90		
15		Pine		96	23	1977	80		
16		Pine		191	18	1982	90		
17		Pine		161	13	1987	130		
18									

*Overstory/Midstory

Summary of Acreage:

Water area 11

Special R.O.W. 5

Road Acreage 45

Managed Forested Land 3390

Non-Managed Forested Land

Non Forested Land

Wildlife Openings

Total Compartment Acres 3451

Compartment 3

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	44	56	57	48	7	23	38	30	36	63
2	69	29	40	73	87	87	100	100	50	79
3	63	37	44	53	27	86	91	81	46	62
4	67	70	42	46	54	64	73	73	52	81
5	66	55	46	49	33	100	100	89	41	76
6	52	57	53	53	19	86	100	90	48	73
7	42	62	43	19	60	73	80	53	34	73
8	42	55	55	19	50	50	30	20	37	63

Four parameters for determination of suitable habitat.

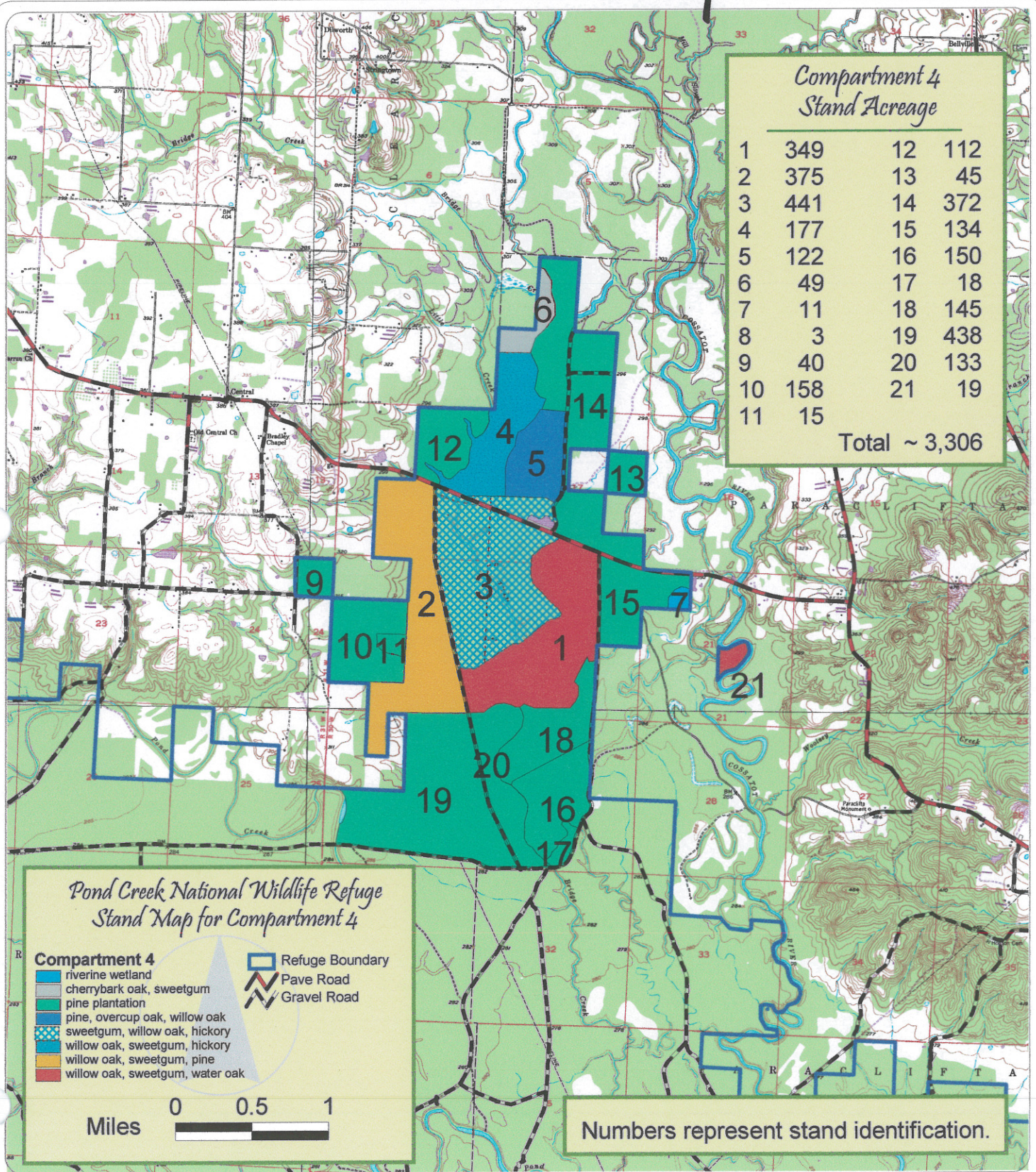
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 4 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 4

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		willow oak, sweetgum, water oak		349	72/23	1928	86		
2		willow oak, sweetgum, hickory		375	56/20	1944	48		
3		sweetgum, willow oak, hickory		441	70/24	1930	64		
4		willow oak, sweetgum, hickory		177	53/12	1947	42		
5		pine, overcup oak, willow oak		122	86/33	1914	79		
6		cherrybark oak, sweetgum		49	90/35	1910	79		
7		riverine wetland		11					
8		riverine wetland		3					
9		Pine		40	18	1982	90		

* Overstory/Midstory

Date: 04/02/2001

COMPARTMENT SUMMARY by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 4

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
10		Pine		158	18	1982	90		
11		Pine		15	13	1987	130		
12		Pine		112	18	1982	90		
13		Pine		45	13	1987	130		
14		Pine		372	13	1987	130		
15		Pine		134	18	1982	90		
16		Pine		150	18	1982	90		
17		Pine		18	18	1982	90		
18		Pine		145	13	1987	130		

*Overstory/Midstory

Summary of Acreage:

Water area 17

Special R.O.W. 0.0

Road Acreage 49

Managed Forested Land 3240

Non-Managed Forested Land

Non Forested Land

Wildlife Openings

Total Compartment Acres 3306

Date: 04/02/2001

COMPARTMENT SUMMARY by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 4

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
19		Pine **		438	18	1982	130		
20		Pine		133	13	1987	90		
21		willow oak, sweetgum, water oak		19					
22									
23									
24									
25									
26									
27									

*Overstory/Midstory **Two different age classes of pine plantations, youngest represented

Summary of Acreage:

Water area 17
Special R.O.W. 0.0
Road Acreage 49

Managed Forested Land 3240
Non-Managed Forested Land
Non Forested Land

Wildlife Openings
Total Compartment Acres 3306

Compartment 4

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	67	51	39	79	19	50	43	62	46	88
2	39	80	44	66	33	67	83	92	28	48
3	59	71	60	66	35	60	90	80	46	65
4	23	76	79	64	0	88	88	75	23	43
5	68	65	70	72	67	67	67	100	33	80
6	93	90	38	63	0	100	100	100	43	110

Four parameters for determination of suitable habitat.

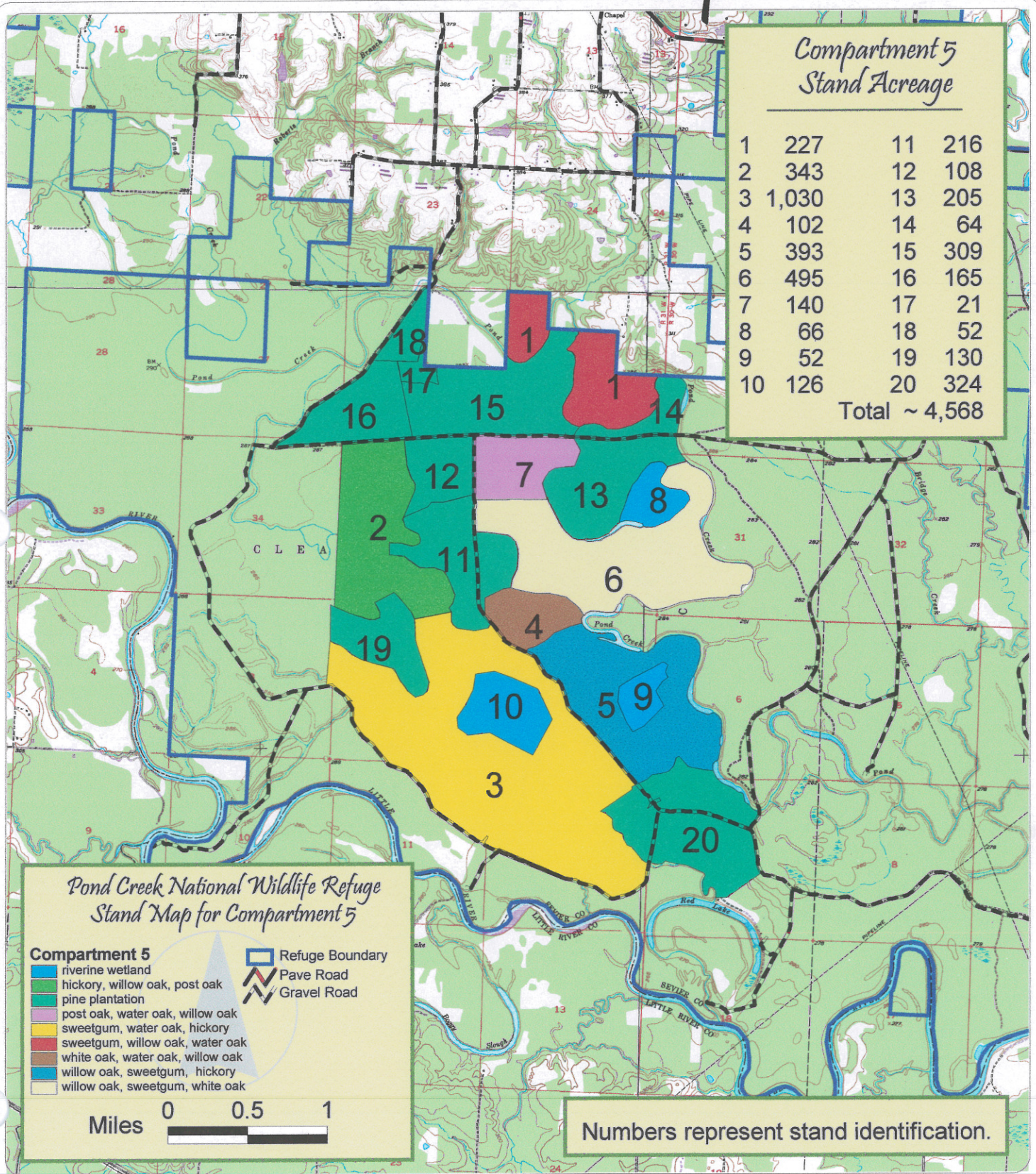
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 5 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 5

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		sweetgum, willow oak, water oak		227	44	1956	66		
2		hickory, willow oak, post oak		343	58	1942	60		
3		sweetgum, water oak, hickory		1,030	60	1940	96		
4		white oak, water oak, willow oak		102	87	1913	83		
5		willow oak, sweetgum, hickory		393	50	1950	107		
6		willow oak, sweetgum, white oak		495	46	1954	70		
7		post oak, water oak, willow oak		140	50	1950	59		
8		riverine wetland		66					
9		riverine wetland		52					

Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 5

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
10		riverine wetland		126					
11		pine		216	13	1982	90		
12		pine		108	18	1982	90		
13		pine		205	18	1982	90		
14		pine		64	13	1987	130		
15		pine **		309	18	1982	90		
16		pine		165	13	1987	130		
17		pine		21	18	1982	90		
18		pine		52	23	1977	80		
19		pine		130	13	1987	130		
20		pine		324	18	1982	90		

*Overstory/Midstory **Two different age classes of pine plantations, youngest represented

Summary of Acreage:

Water area 254
 Special R.O.W. 0.0
 Road Acreage 40

Managed Forested Land 4274
 Non-Managed Forested Land
 Non Forested Land

Wildlife Openings
 Total Compartment Acres 4568

Compartment 5

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	43	41	59	45	13	44	63	56	29	66
2	37	32	64	40	56	56	81	50	29	61
3	64	55	39	41	37	29	29	27	36	96
4	62	59	35	17	67	67	16	67	41	83
5	58	62	29	25	83	78	6	39	46	107
6	57	57	44	47	59	35	41	24	38	71
7	50	44	53	47	100	78	78	100	49	60

Four parameters for determination of suitable habitat.

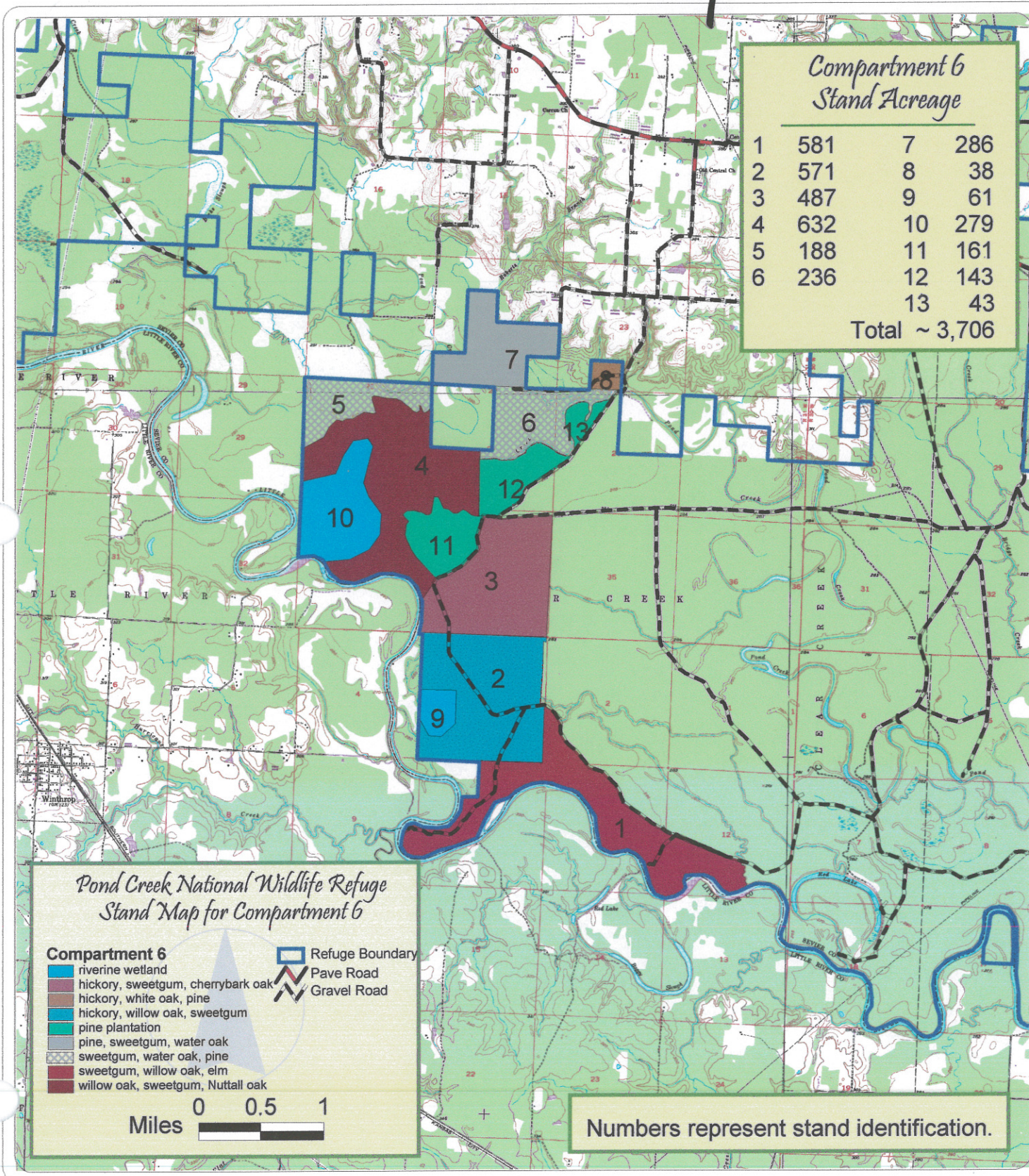
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 6 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 6

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		sweetgum, willow oak, elm		581	58/33	1942	84		
2		hickory, willow oak, sweetgum		571	67/32	1933	66		
3		hickory, sweetgum, cherrybark oak		487	51/40	1949	63		
4		willow oak, sweetgum, Nuttall oak		632	45/30	1955	78		
5		pine, sweetgum, water oak		188	35	1965	96		
6		sweetgum, water oak, pine		236	80/40	1920	84		
7		Pine, sweetgum, water oak		286	38/21	1962	57		
8		hickory, white oak pine		38	55/22	1945	90		
9		riverine wetland		61					

* Overstory/Midstory **Two different age classes of pine plantations, youngest represented

Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 6

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
10		riverine wetland		279					
11		pine		161	13	1987	130		
12		pine		143	18	1982	90		
13		pine		43	18	1982	90		
14									
15									
16									
17									
18									

*Overstory/Midstory

Summary of Acreage:

Water area 340

Special R.O.W. 0.0

Road Acreage 36

Managed Forested Land 3330

Non-Managed Forested Land

Non Forested Land

Wildlife Openings

Total Compartment Acres 3706

Compartment 6

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	53	23	22	56	57	56	48	70	n/a	85
2	53	34	16	55	50	59	63	63	n/a	66
3	59	38	12	58	85	85	8	60	37	64
4	58	31	80	41	40	60	45	35	35	79
5	61	42	9	33	67	67	33	22	41	96
6	54	40	7	32	33	44	44	33	35	84
7	60	30	6	49	10	60	60	60	35	57
8	63	40	10	43	5	5	5	0	38	90

Four parameters for determination of suitable habitat.

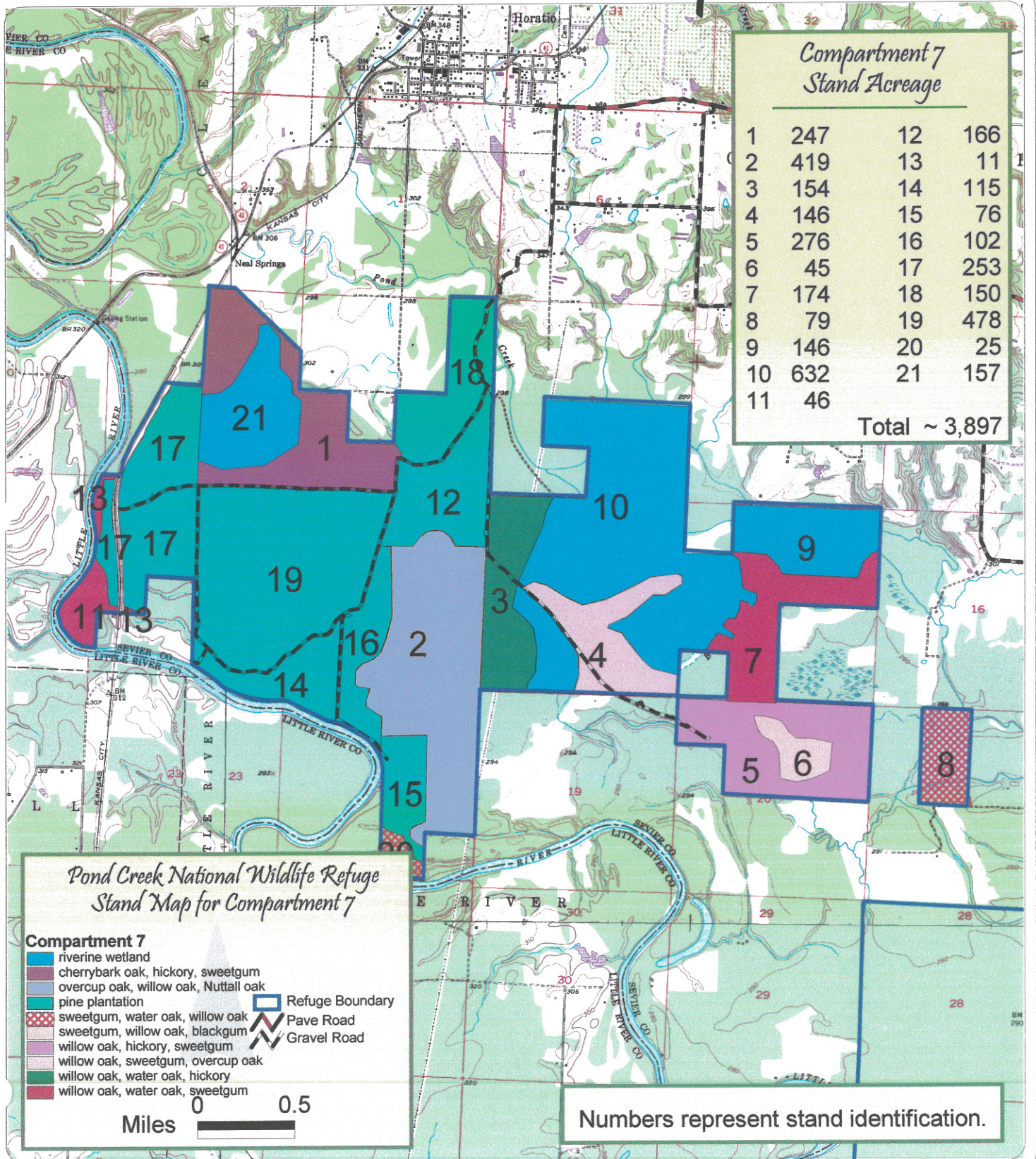
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 7 Stand Map



Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 7

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		cherrybark oak, hickory, sweetgum		247	52/20	1948	86		
2		overcup oak, willow oak, Nuttall oak		419	57/27	1943	95		
3		willow oak, water oak, hickory		154	59/16	1941	104		
4		sweetgum, willow oak, blackgum		146	41/29	1959	66		
5		willow oak, sweetgum, overcup oak		231	49/26	1951	79		
6		willow oak, water oak, hickory		45	45/27	1955	55		
7		willow oak, water oak, sweetgum		174	43/32	1957	108		
8		sweetgum, water oak, willow oak		79	65/28	1935	117		

Date: 04/02/2001

COMPARTMENT SUMMARY by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 7

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
9		riverine wetland		146					
10		riverine wetland		632					
11		willow oak, water oak, sweetgum		46					
12		pine		166	30	1970	78		
13		willow oak, water oak, sweetgum		11					
14		pine		115	30	1970	96		
15		pine		76	30	1970	87		
16		pine		102	30	1970	91		
17		pine		253	30	1970	96		

*Overstory/Midstory

Summary of Acreage:

Water area 250

Special R.O.W. 16

Road Acreage 39

Managed Forested Land 3547

Non-Managed Forested Land

Non Forested Land

Wildlife Openings

Total Compartment Acres 3852

Date: 04/02/2001

COMPARTMENT SUMMARY
by STAND

Treatment Year 01

Refuge Pond Creek State AR County Sevier Compartment 7

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
18		pine		150	30	1970	49		
19		pine		478	30	1970	75		
20		willow oak, water oak, sweetgum		25					
21		beaver pond		157					
23									
24									
25									
26									
27									

* Overstory/Midstory

Summary of Acreage:

Water area 250

Special R.O.W. 16

Road Acreage 39

Managed Forested Land 3547

Non-Managed Forested Land

Non Forested Land

Wildlife Openings

Total Compartment Acres 3852

Compartment 7

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	71	61	35	33	44	88	44	31	45	86
2	70	39	11	38	29	29	25	25	39	96
3	71	43	20	47	31	54	54	46	40	104
4	63	32	11	20	67	67	67	67	37	67
5	64	34	27	56	78	78	78	78	40	79
6	36	18	5	51	25	25	25	25	17	55
7	67	36	12	26	81	81	73	73	40	109
8	74	43	11	24	100	100	100	100	43	118

Four parameters for determination of suitable habitat.

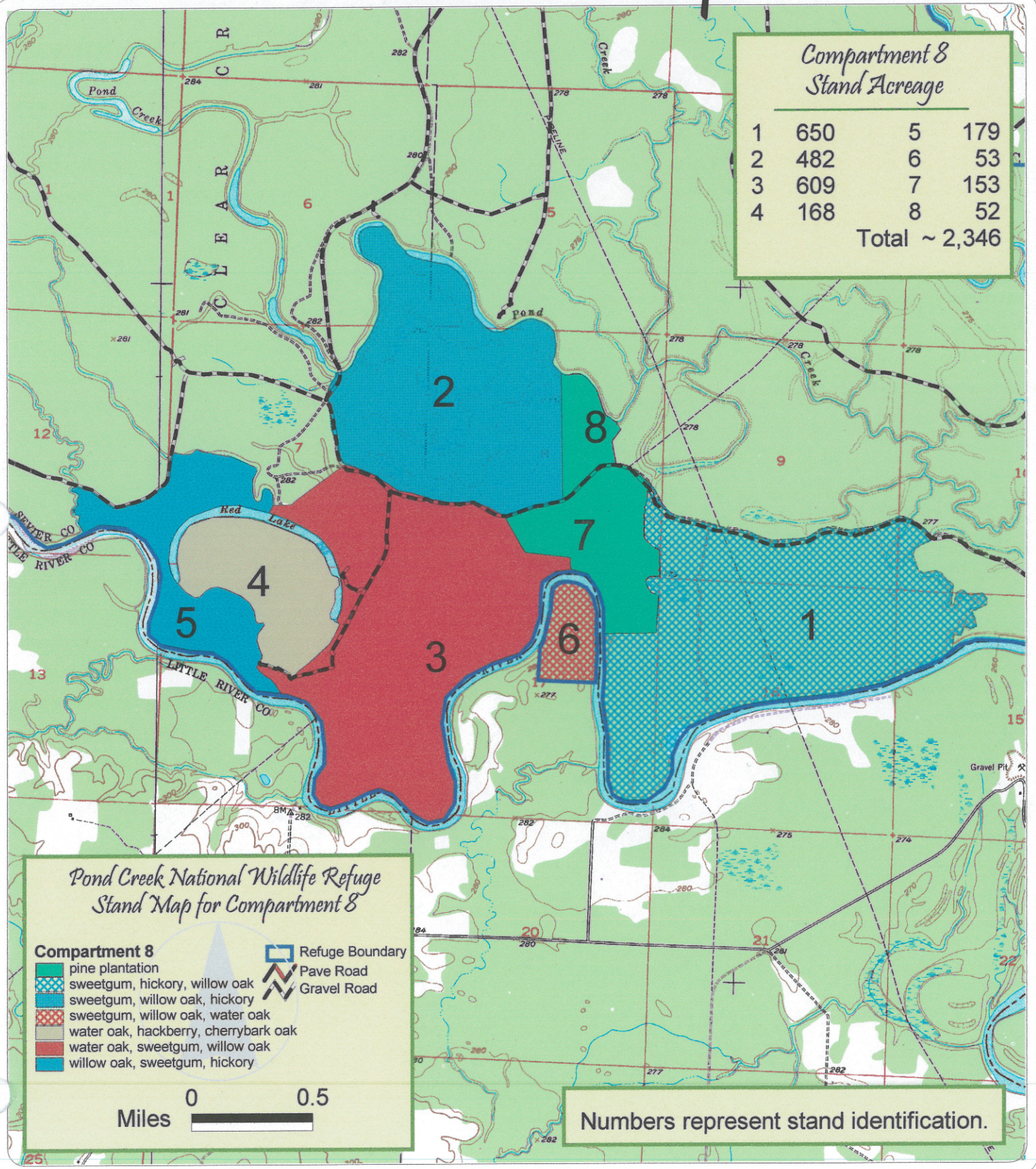
Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Compartment 8 Stand Map



Date: 04/02/2001COMPARTMENT SUMMARY
by STANDTreatment Year 01Refuge Pond Creek State AR County Sevier & Little River Compartment 8

Stand No.	Land Class	Forest Type	Stand Condition	Gross Acres	Age O/M*	Birth	Basal Area B / A	Treatment Needed	Remarks
1		sweetgum, hickory, willow oak		650	53	1947	66		
2		sweetgum, willow oak, hickory		482	47	1953	81		
3		sweetgum, willow oak, water oak		609	38/30	1962	67		
4		water oak, hackberry, cherrybark oak		168	44/19	1956	77		
5		willow oak, sweetgum, hickory		179	45	1955	75		
6		water oak, sweetgum, willow oak		53					
7		Pine		153	18	1982	90		
8		Pine		52	18	1982	90		

* Overstory/Midstory

Summary of Acreage:

Water area _____

Special R.O.W. 12Road Acreage 18Managed Forested Land 2316

Non-Managed Forested Land _____

Non Forested Land _____

Wildlife Openings _____

Total Compartment Acres 2346

Compartment 8

Stand	Percent vegetative occupancy				Percentage of plots with vines				Cro. dia.'	Basal Area
	Overstory	Midstory	Understory	Ground	Overstory	Midstory	Understory	Ground		
1	48	41	40	45	0	14	54	14	48	68
2	56	44	41	48	0	0	48	52	46	83
3	49	31	12	34	36	68	82	79	35	68
4	59	32	18	31	25	75	88	75	44	78
5	64	41	11	28	100	75	100	100	37	75

Four parameters for determination of suitable habitat.

Percent vegetative occupancy for each stand layer.

Vine percentage for each stand layer, percent of plots with vines present.

Average crown diameter in feet for the stand. Nearest dominant tree to plot center used.

Basal area in square feet per acre.

Literature Cited

Literature Cited

- Arkansas Natural Heritage Commission. 1991. Pond Creek Bottoms, Sevier and Little River Counties. Unpublished site report. Arkansas Natural Heritage Commission, Little Rock, Arkansas.
- Cooper, R.J. and R.P. Ford. 1993. Productivity and abundance of neotropical migratory birds in bottomland hardwood forest of the Mississippi alluvial valley. Annual Progress Report, Memphis State University, Memphis, Tennessee. 11pp.
- Dugger, Katie M. and Leigh H. Fredrickson. 2001. Life History and Habitat Needs of the Wood Duck, Wetland Management for Waterfowl (handbook). Publisher N/A. PP.53-59.
- Hamel, Paul and Dave Tweed. 2000. Conversation/interview at DeQueen, AR in December,2000. Discuss suitable habitat for neotropical migratory birds.
- Heck, Berlin. 1997. Personal communication. Refuge Manager, Little River National Wildlife Refuge, Broken Bow, Oklahoma.
- Hunter, W.C., D.N. Pashley and R.E.F. Escano. 1992. Neotropical migratory landbird species and their habitats of special concern within the Southeast region. Pages159-169 in D.M.
- Moore, L. 1993. Population dynamics and habitat requirements of wild turkeys in the Ouachita Mountain range. Annual Progress Report, University of Arkansas Cooperative Wildlife and Fish Unit, Fayetteville, Arkansas. 4pp.
- Runkle, J.R. 1991. Natural disturbance regimes and maintenance of stable regional floras. Pages 31-47 in Henderson and Hedricks, eds., Restoration of Old Growth Forests in the Interior Highlands of Arkansas and Oklahoma. Winrock International, Petit Jean, Arkansas.
- Skiles, Albert. N.d. Arkansas Climate Atlas, p. 93 Arkansas Entergy Office, Little Rock, Arkansas.
- Smith, Richard M. 1989. The Atlas of Arkansas. University of Arkansas Press, Fayetteville, Arkansas. 226pp.
- Stroud, Hubert. B. and Gerald T. Hanson. 1981. Arkansas Geography: Physical Landscape and the Historical and Cultural Setting. Rose Publishing Co., Little Rock, Arkansas. 86pp.
- The Nature Conservancy. 1995. Ecological Assessment: Forest Lands in Arkansas and Oklahoma Proposed for Inclusion into the Ouachita National Forest and Cossatot National Wildlife Refuge. The Nature Conservancy, Arkansas Fields Office, Little Rock, Arkansas. 112pp.
- The Nature Conservancy. 1996. Technical Supplement to: An Ecological Assessment of Forest

Lands in Arkansas and Oklahoma Proposed for Inclusion into the Ouachita National Forest and Cossatot National Wildlife Refuge. The Nature Conservancy, Arkansas Fields Office, Little Rock, Arkansas. 114pp.

U.S. Department of Agriculture. 1984. Soil Survey of Lafayette, Little River, and Miller Counties, Arkansas. Soil Conservation Service, Little Rock, Arkansas. 176pp.

U.S. Department of Agriculture. 1992. Census of Agriculture, Arkansas, 1992. U.S. Department of Agriculture, Washington, D.C.

U.S. Soil Conservation Service. 1984, 1974.

Yaich, S.C. 1990. Arkansas implementation plan for the North American Waterfowl Management Plan. Arkansas Game and Fish Commission, unpublished report. Little Rock, Arkansas. 65pp.

Appendix

Appendix A

Timber / Habitat Data Collection Sheet Instructions 1/5 Acre Plot Radius = 52.79'~ (52.8')

- Refuge: Self explanatory
- Crew: Crew members name
- Crown Diameter: Measure the crown diameter (in feet) of a dominant tree nearest plot center.
- Comp#: Compartment designation
- Stand#: Self explanatory
- Line#: Identify line number corresponding to lines on map.
- Plot#: List plot numbers consecutively corresponding to direction of travel.
- SAF Type: Society of American Foresters stand type
- % Density: Percent of foliage coverage using a densitometer at plot center.
- Growth: Measure in tenths of inches the newest 10 years growth.
- Age: Predominant age of stand; list two ages if the stand has two distinctive ages. Age midstory on plots that end in "5". Age overstory on plots that end in "0".
- GPS Lat. Long.: Identify plot center using latitude and longitude reading from GPS unit.
- Overstory: Trees with crowns that are by definition "the overstory".
Species- letter designation as provided, write "snag" if tree is dead.
DBH- inches, to the nearest 2" DBH class
Height-Total tree height (in feet), write "cull" if tree is not merchantable.
Den- check if present
Vines- check if present
% cover- percent of occupied overstory as compared to 100%. 100% being the most dense crown closure possible for southern hardwood forests. This is a subjective measurement and is independent of all the other percentage measurements.
- Midstory: Measure trees down to 4.0" DBH and over 10 feet tall. The upper limit for DBH/height will be determined by you deciding if the tree's crown is in the midstory or not.
- Understory: List up to three of the most predominant species between 3 feet and 10 feet in height.
- % cover: Again list the percentage of what's there as compared to the most that could be there. Independent of all other percentage measurements.
- Vines: Check if present. Exclude honeysuckle.
- Herbaceous Ground Cover: Same as for understory except vegetation is less than 3 feet in height.
- Reproduction: Check listed species if present.

Line Cruise - 2" DBH Class

Felsenthal NWR Forestry Dept. 03/10/2000

Refuge: _____ Date: _____

Crew: _____

Crown Dia. _____ Comp# _____ SAF type _____
 Stand# _____ %Density _____
 Line# _____ Growth _____
 Plot# _____ Age _____

GPS Lat. _____ Long. _____				GPS Lat. _____ Long. _____						
Species	DBH	Height	Den	% Cover* Vines*	Species	DBH	Height	Den	% Cover* Vines*	
Overstory					Overstory					
Midstory >10' ≥ 4" DBH					Midstory >10' ≥ 4" DBH					
Understory 3' -10'					Understory 3' -10'					
Herbaceous Ground Cover <3'					Herbaceous Ground Cover <3'					
Reproduction:					Reproduction:					
Red Oak					Red Oak					
White Oak					White Oak					
Pine					Pine					
Other					Other					

* measurement on 1/5 ac. plot

* measurement on 1/5 ac. plot

APPENDIX B - Avifaunal Analysis

West Gulf Coast Plain Partners in Flight Bird Conservation Plan: Section 2 Avifaunal Analysis

Priority bird species for the West Gulf Coastal Plain: Entry criteria and selection rationale

Priority Entry Criteria ¹		Total PIF Priority Species Score	Concern Scores		Percent of BBS Population	Local Migratory Status 2	Geographical or Historical Notes
			Area Importance	Population Trend			
Ia.	Red-cockaded Woodpecker	32	5 ⁴	4 ⁴	8.1	R	
	Swallow-tailed Kite	29	3 ⁴	5 ⁴		E (LA, TX)	Widespread prior to 1900
	Southeast U.S. subsp.						
	Swainson's Warbler	29	5	3	32.1 ³	B	
	Bewick's Wren ⁴⁷ Eastern subsp.	28	2	5 ⁴		B (AR, OK)	Formerly common
Ib.	American Kestrel	27	44	44		R	
	Southeastern subsp.						
	Bachman's Sparrow	27	4 ⁴	3	10.1	D	
	Kentucky Warbler	26	3	5	18.4 ³	B	
	Cerulean Warbler	25	2	3	1.3 [?]	B (AR)	
	Prothonotary Warbler	24	3	5	6.2	B	
	Chuck-will's-widow	24	5	5	9.4	B	
	Brown-headed Nuthatch	24	5	2	13.8	R	
	Worm-eating Warbler	24	3	3	4.4	B	
	Hooded Warbler	24	5	4	20.2 ³	B	
	Scissor-tailed Flycatcher	23	3	4	4.1	B	
	Bell's Vireo	23	2	3		B	
	White-eyed Vireo	23	5	5	19.5 ³	B	
	Prairie Warbler	23	3	5	4.4	B	
	Orchard Oriole	22	5	5	7.6	B	
	Yellow-billed Cuckoo	22	5	5	9.4	B	
	Red-headed Woodpecker	22	4	5	3.2	D	
	Eastern Wood-Pewee	22	5	5	6.2	B	
	Louisiana Waterthrush	22	3	3	4.0	B	

¹ Entry criteria:

Ia. Overall Highest Priority Species. Species with total score 28-25. Ordered by total score. Consider deleting species with AI < 2 confirmed to be of peripheral occurrence and not of local conservation interest, but retain species potentially undersampled by BBS or known to have greatly declined during this century.

APPENDIX B cont. - Avifaunal Analysis

Ib. Overall High Priority Species. Species with total score 22-27. Ordered by total score. Consider deleting species with $AI \leq 2$ confirmed to be of peripheral occurrence and not of local conservation interest, but retain species potentially undersampled by BBS or known to have greatly declined during this century.

² Local Migratory Status, codes adapted from *Texas Partners in Flight* as follows:

- A = Breeds in temperate or tropical areas outside of region, and winters in temperate or tropics outside of region (*i.e.*, passage migrant).
- B = Breeds in temperate or tropical areas including the region, and winter exclusively in temperate or tropics outside the region (*i.e.*, includes both breeding and transient populations).
- C = Breeds in temperate or tropical areas outside of region, and winters in both the region and in temperate or tropical areas beyond area (*i.e.*, includes both transient and wintering populations).
- D = Breeds and winters in the region, with perhaps different populations involved, including populations moving through to winter beyond the region in temperate or tropical areas (*i.e.*, populations may be present throughout year, but may include a large number of passage migrants).
- E = Species reaching distributional limits within the region, either as short-distance or long-distance breeding migrants, but at population levels above peripheral status.
- F = Same as E except for wintering (non-breeding) migrants.
- R = Resident, generally non-migratory species (though there may be local movements).
- RP = Resident, non-migratory species, reaching distributional limits within the region, but at population levels above peripheral status.
- P = Pelagic, breeding grounds outside of region, but can occur during breeding season.
- PB = Post-breeding dispersal or non-breeding resident; species present during breeding season, but not known to be breeding in the region proper.

³ Highest percent of breeding population recorded in temperate North America; numbers in “ ” are likely projections; ? Indicates species widespread outside of temperate North America and/or waterbirds poorly sampled by Breeding Bird Survey within physio. area.

⁴ AI or PT score revised from what was derived by BBS data, or lack thereof, based on better local information.

Species suites for Pond Creek National Wildlife Refuge*

PIF	-----Bottomland Forests-----				Pine Plantation
Score	Understory	Canopy	Midstory	Edge	
29	Swainson's Warbler (drier)	Swallow-tailed Kite			
26	Kentucky Warbler (drier)	Cerulean Warbler			
24	Chuck-will's-widow (drier)		Prothonotary Warbler		Worm-eating Warbler (?)
	Hooded Warbler				
23	Bell's Vireo (willow thickets)			White-eyed Vireo	Prairie Warbler
22	Louisiana Waterthrush	Yellow-billed Cuckoo		Orchard Oriole	
		Red-headed Woodpecker			

* Species Suites, generated from Table 24, are as fairly discrete groups of species, and these groups are based on present and potential habitat conditions.

Priority Landbirds for BCR 25, West Gulf Coastal Plain

Working Version - May 2002

Compiled by:

**Landbird Technical Group,
LMVJV West Gulf Coastal Plain Conservation Planning Team**

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1. Introduction

Landbird priorities in this report were determined using Partners in Flight (PIF) breeding and wintering conservation assessment data for BCR 25 and the PIF species prioritization protocol (Carter *et al.* 2000 and revisions). Conservation assessment scores are generated for seven parameters believed to be of relevance in objectively determining a species' conservation status. In brief, these parameters relate to the size of a species overall breeding and wintering range, its rangewide abundance relative to other species, real and anticipated threats to breeding and wintering habitats, population trend in the region of interest, and its relative abundance in the region of interest as compared to its relative abundance in other regions.

In practice, species with small overall range sizes, low relative abundance, high threats to habitats, and declining populations receive higher scores and are thus considered greater priorities for conservation. In addition, those species for which a particular region supports a disproportionate share of the overall population represent

conservation responsibilities for the region, whether or not they are declining or otherwise threatened.

2. Relationship Between Priority List and Conservation Status

Although organized into tiers, the priority species list for the West Gulf Coastal Plain is not necessarily intended to imply a strict hierarchical prioritization among species included. Rather, tiers assist in explaining the reason for each species' eventual entry onto the list (as outlined below). In general, higher scores indicate priorities or at least highlight species whose individual parameter scores are worth a closer inspection in determining their conservation status. However, all species on the list should be considered of conservation significance, with warranted actions based on the means of entry.

Tier I. High Overall Priority – Includes species that are typically of high conservation concern throughout their range. These are species showing high vulnerability in a number of factors scored in the assessment process. Species at the periphery of their distribution or without manageable populations are omitted. Typically divided into Extremely High (IA) and High Priority (IB) tiers based on total assessment score.

Tier II. High Regional Priority – Includes species that are of moderate overall priority, but deserve conservation attention within a region because of various combinations of high vulnerability scores. There are currently three subdivisions of Tier II used by PIF.

Tier IIA. Regional Concern – Includes species that are experiencing declines in the core of their range and require immediate conservation action to reverse or stabilize trends. These are species with a combination of high relative abundance as compared to other regions and a declining (or unknown) population trend.

Tier IIB. Regional Responsibility – Includes additional species for which the region shares in the responsibility for long term conservation, even if they are not currently declining or otherwise threatened. These are species of moderate overall priority with a disproportionately high percentage of their total population occurring in the region.

Tier IIC. Regional Threats – Includes additional species of moderate overall priority whose remaining populations are threatened primarily because of extreme threats to sensitive habitats. These species may be relatively uncommon in the region relative to other regions. These are species with high breeding and non-breeding threats scores.

Tier III. Additional Stewardship Priorities – Includes species on the PIF US watch list and federal endangered species list that are not captured in any above tiers.

Tier IIIA. US Watch List – These species score highly based on their global assessment scores, which measure conservation vulnerability throughout their range as opposed to just within the region. Thus, these species warrant conservation attention wherever they occur. Watch List species that fall out here are usually of moderate overall priority, but may have stable or even increasing populations within the given region.

Tier IIIB. Federally Listed Species – Includes species listed under the Endangered Species Act. These species should receive conservation attention wherever they occur.

Tier IV. State Listed or Local Management Interest – This tier is extremely flexible and is where a species that is of state or local management concern – for any number of reasons – can be placed for consideration.

Tier IVA. State Listed Species – Includes species on state endangered species or natural heritage lists that do not fall out in above tiers.

Tier IVB. Local Management Interest – Includes species that do not rank into above tiers but for which there is local concern for and desire to give formal consideration to by placing on the priority list. May include species with positive or negative socio-economic or ecological values.

Table 1. Priority Landbirds for BCR 25, West Gulf Coastal Plain

Priority entry tier ¹ and species	Local migratory status ^{2, 3}
--	--

I. High Overall Priority

IA. Extremely High Priority

Swallow-tailed Kite (ssp. <i>forficatus</i>)	B
Red-cockaded Woodpecker	R
Swainson's Warbler	B

IB. High Priority

American Kestrel (ssp. <i>paulus</i>)	B
American Woodcock	B, W
Short-eared Owl	W
Chuck-will's-widow	B
Red-headed Woodpecker	B,W
Eastern Wood-Pewee	B
Acadian Flycatcher	B
Scissor-tailed Flycatcher	B
Loggerhead Shrike	B,W

Table 1. Priority Landbirds (cont.)

Priority entry tier ¹ and species	Local migratory status ^{2, 3}
White-eyed Vireo	B,(W)
Bell's Vireo	B
Yellow-throated Vireo	B
Brown-headed Nuthatch	R
Bewick's Wren	B,W
Wood Thrush	B
Brown Thrasher	B,W
Sprague's Pipit	W
Yellow-throated Warbler	B
Prairie Warbler	B
Cerulean Warbler	(B)
Prothonotary Warbler	B
Worm-eating Warbler	B
Louisiana Waterthrush	B
Kentucky Warbler	B
Hooded Warbler	B
Bachman's Sparrow	R
Field Sparrow	B,W
Henslow's Sparrow	W
Le Conte's Sparrow	W
Harris's Sparrow	W
Smith's Longspur	W
Orchard Oriole	B

II. High Regional Priority**IIA. Regional Concern**

Northern Bobwhite	R
Yellow-billed Cuckoo	B
Ruby-throated Hummingbird	B
Yellow-bellied Sapsucker	W
Pileated Woodpecker	R
Eastern Kingbird	B
Carolina Chickadee	R
Blue-gray Gnatcatcher	B,W
Black and White Warbler	B
Eastern Towhee	(B),W
Grasshopper Sparrow	B,W
Eastern Meadowlark	R
Rusty Blackbird	W

IIB. Regional Responsibility

Pine Warbler	B,W
Yellow-breasted Chat	B
Summer Tanager	B

IIC. Regional Threats

Northern Harrier	W
Sedge Wren	W
Painted Bunting	B
Dickcissel	B

III. Additional Stewardship Priorities

IIIA. US Watch List - none

IIIB. Federally Listed Species

Bald Eagle	B,W
Peregrine Falcon	W

State Listed or Local Management Interest

IVA. State Listed Species - none

IVB. Local Management Interest

Red-shouldered Hawk	R
Wild Turkey	R
Scarlet Tanager	(B) – Ouachita Mtns.
Rufous-crowned Sparrow	(R) – Ouachita Mtns.
Lark Sparrow	B,(W)
Nelson's Sharp-tailed Sparrow	T

¹ Tier rankings based on Partners in Flight (PIF) breeding and wintering species assessment scores for BCR 25 and the PIF prioritization protocol (Carter *et al.* 2000 and revisions). Within tiers, species occur in taxonomic order

² For species that occur year round in the BCR and whose breeding and wintering assessment scores differed, a determination was made as to which seasonal score was most relevant for use in ranking.

³ B – Breeding, R – Permanent Resident, T – Transient, W – Wintering in the BCR. R indicates year round occurrence of nonmigratory populations. B,W indicates year round occurrence, but breeding and wintering populations consist of different individuals and often differ in magnitude. T indicates occurrence primarily in the migratory period(s). Parentheses indicate a species is approaching its distributional limit for that season, and may occur quite uncommonly.

3. Priority Species-Habitat Suites

Once priority species were identified for the West Gulf Coastal Plain as a whole, the landbird group then defined several habitat categories broad enough for planning purposes yet specific enough to be ecologically relevant to bird conservation. Our planning efforts will focus on these. Understanding that conservation action would be directed at habitats, not individual species, we organized priority landbirds into species suites representative of each habitat and attempted to identify preliminary "umbrella" species that would guide our planning efforts for the whole suite. We assumed that conservation actions directed at the suite of priority species or even a single umbrella species representative of a given habitat would promote conservation of the entire avifauna in that habitat. We will closely examine the accuracy of this assumption.

We identified 14 habitat categories of relevance to landbirds:

Agricultural – Cropland	"Other" Pine Forest
Agricultural – Pastureland	Pine Plantation
Bottomland Hardwood Forest	Pine Savannah
Early Successional – Old Field	Riparian
Early Successional – Forest Openings	Tall Grasslands
Marshland	Upland Hardwood/Mixed Pine-Hardwood
Forest	Urban
Open Water	

We chose to pursue development of planning models for 8 of these habitats based on the ecological requirements of priority species found in each. We are exploring use of the "umbrella" species concept for each of these where applicable. These 8 habitats are: bottomland hardwood forest, pine savannah, "other" pine forest not plantations, upland hardwood/mixed pine-hardwood forest, riparian, early successional-old field, early successional-clear cuts, and tall grasslands.

Best management practices will be developed for 4 other habitat types: agriculture-cropland, agriculture-pastureland, pine plantations, and urban areas. Although these habitats are important to several priority species, we do not want to promote expansion of these habitats by developing models and quantitative objectives for them. Rather, we hope to promote actions on these lands appropriate for and compatible with bird conservation.

The remaining habitats, open water and marshland, provide important habitat for the fewest priority landbirds. It was assumed that appropriate models for these habitats would be developed by other technical groups focusing on waterfowl and waterbirds, thus the landbird group will not consider them. Our goals will be to ensure that waterfowl and waterbird technical groups give proper consideration to the priority landbird species that co-occupy these habitats when developing models and objectives.

Table 2. Priority Landbird Species by Habitat Type, West Gulf Coastal Plain Bird Conservation Region

Priority entry tier and species	Habitat type													
	AC	AP	BH	ESO	ESF	ML	OW	P	PP	PS	R	TG	UH	U
High Overall Priority														
IA. Extremely High Priority														
Swallow-tailed Kite (<i>forficatus</i>)			X											
Red-cockaded Woodpecker										X-U				
Swainson's Warbler			X					S			X			
IB. High Priority														
American Kestrel (<i>paulus</i>)	X	X		X	X					X		X		
American Woodcock			X	X	X							S	X	
Short-eared Owl	S					X						X		
Chuck-will's-widow								X					X-U	
Red-headed Woodpecker			X							X			X	X
Eastern Wood-Pewee			X							X			X	
Acadian Flycatcher			X								X			
Scissor-tailed Flycatcher	X	X										X		X
Loggerhead Shrike	X	X								X		X		X
White-eyed Vireo			X	X	X			S			X			
Bell's Vireo				X							X			
Yellow-throated Vireo			X										X-U	
Brown-headed Nuthatch								X-		X-U			X	
Bewick's Wren	X	X		X										X
Wood Thrush			X								X			
Brown Thrasher	X	X		X	X									X
Sprague's Pipit	X	X												
Yellow-throated Warbler			X							X	X			
Prairie Warbler				X	X					X				

Table 2. Priority landbird species by habitat type (cont.)

Priority entry tier and species	Habitat type													
	AC	AP	BH	ES _O	ES _F	ML	OW	P	PP	PS	R	TG	UH	U
IB. High Priority (cont.)														
Cerulean Warbler			X								X			
Prothonotary Warbler			X								X			
Worm-eating Warbler								S			X		X-U	
Louisiana Waterthrush											X-U			
Kentucky Warbler			X		S						X		X-U	
Hooded Warbler			X		S			S			X		X	
Bachman's Sparrow				S	S					X				
Field Sparrow	X	X		X										X
Henslow's Sparrow										X		X		
Le Conte's Sparrow	S									X		X		
Harris's Sparrow	X	X												
Smith's Longspur		X												
Orchard Oriole			X	X	X						X			
High Regional Priority														
IIA. Regional Concern														
Northern Bobwhite	X			X						X		X-U		
Yellow-billed Cuckoo			X								X		X-U	
Ruby-throated Hummingbird			X		S					X	X		X	X
Yellow-bellied Sapsucker			X					S		S	X		X	X
Pileated Woodpecker			X					X			X		X	
Eastern Kingbird	X	X		X		X				X		X		
Carolina Chickadee			X					X		X	X		X	X
Blue-gray Gnatcatcher			X								X		X	
Black-and-white Warbler			X										X	
Eastern Towhee			X		X			S		S				X
Grasshopper Sparrow		X										X		

Table 2. Priority landbird species by habitat type (cont.)

Table 2. Priority landbird species by habitat type (cont.)														
Priority entry tier and species	Habitat type													
	AC	AP	BH	ES O	ES F	ML	OW	P	PP	PS	R	TG	UH	U
IIA. Regional Concern (cont.)														
Eastern Meadowlark	X	X								S		X		
Rusty Blackbird			X								X			
IIB. Regional Responsibility														
Pine Warbler								X-U		X-U			X	
Yellow-breasted Chat			X		X			X		X				
Summer Tanager			X					X		X	X		X	
IIC. Regional Threats														
Northern Harrier	X	X				X						X		
Sedge Wren	S	S				X				X		X		
Painted Bunting	S	S		X							S			
Dickcissel	S	S		S								X		
Additional Stewardship Priorities														
IIIA. US Watch List – none														
IIIB. Federally Listed Species														
Bald Eagle			X			X	X							
Peregrine Falcon						X	X							X
State Listed / Local Mgt. Interest														
IVA. State Listed Species – none														
IVB. Local Mgt. Interest														
Red-shouldered Hawk			X								X		X	
Wild Turkey			X					X		X	X		X	
Scarlet Tanager (Ouachitas)														
Rufous-crowned Sparrow (Ouachita)				X										

Table 2. Priority landbird species by habitat type (cont..)

	Habitat type													
Priority entry tier and species	AC	AP	BH	ES _O	ES _F	ML	OW	P	PP	PS	R	TG	UH	U
IVB. Local Mgt. Interest (cont.)														
Lark Sparrow	X	X		X										
Nelson's Sharp-tailed Sparrow						X						X		

Habitats:

(AC) Agriculture Cropland – Land under active cultivation including field borders.

(AP) Agriculture Pastureland – Grazed land including field borders.

(BH) Bottomland Hardwood Forest – Areas dominated by woody broadleaf vegetation (including baldcypress) that is periodically or seasonally flooded (hydric to mesic).

(ESO) Early Successional – Old Field – Lands with significant woody vegetation component less than 20 feet tall usually produced by the abandonment of agricultural land. Degree and extent of woody versus grassy/herbaceous cover variable.

(ESF) Early Successional Forest Openings – Lands with significant woody vegetation component less than 20 feet tall usually generated through active forest management within a forested matrix. Degree and extent of woody versus grassy/herbaceous cover variable.

(ML) Marshlands – Lands that are flooded for at least part of the year by water less than six feet deep and predominantly covered with emergent, herbaceous or floating vegetation.

(OW) Open Water – Water greater than six feet deep with no floating or emergent vegetation.

(P) "Other" Pine Habitats – All forests that are greater than 80 percent pine and neither a savannah nor a plantation.

(PP) Pine Plantation – Densely stocked, short-rotation pine forests planted and managed for commercial wood and fiber production. No species were identified for this habitat type.

(PS) Pine Savannah – Forests greater than 80 percent pine that typically have very low basal area and a significant grassy/herbaceous component.

(R) Riparian – Broadleaf dominated river/stream borders less than 100 feet wide (more than 100 feet wide becomes BH) where the vegetative composition is influenced by flooding and/or the moisture regime of the river/stream.

(TG) Tall Grasslands – Areas clearly dominated by herbaceous vegetation greater than 10 inches tall at the peak of the growing season. Cultivated hay fields and pastures are excluded.

(UH) Upland Hardwood/Mixed Pine-Hardwood Forest – All forest that is less than 80 percent pine and usually not flooded (mesic to xeric).

(U) Urban – Developed areas.

Designations:

X – Primary habitat.

X-U – Primary habitat and the species is being considered as a preliminary 'umbrella' species.

S – Secondary habitat; species' needs are better met in another habitat type and that this habitat is not essential for the species.

10/10/02

POND CREEK NATIONAL WILDLIFE REFUGE
LOCKESBURG, ARKANSAS

CONDITIONS APPLICABLE TO TIMBER HARVEST PERMIT: Sale: #

1. Except where specifically authorized by a Special Use permit, all regulations governing activities on national wildlife refuges in general and specific public use regulations for Pond Creek NWR (including littering, possession and use of firearms, and protection of wildlife) apply.
2. All logging will be within the boundaries specified (see attached map) and coordinated with the Refuge Forester or his designee.
3. Trees shall be cut so as to leave a stump not more than six inches above root collar for sawtimber and six inches high for pulpwood on the side adjacent to the highest ground. Trees are painted at eye level and at the stump; ground level paint spot must be visible after tree has been cut. All marked trees must be cut. In the event any marked trees are not cut by permittee, refuge personnel will have the trees cut and will withhold from the permittee's performance guarantee a sufficient amount to cover the cost incurred.
4. Logging will not be permitted when the ground is wet and subject to rutting or severe soil compaction. The permittee and his employees will do all in their power to prevent rutting and erosion. Permittee will be required to fill any ruts made as a result of his/her operation.
5. Only marked or designated trees shall be cut. Utmost care shall be exercised to protect all other trees and vegetation from damage. **Additional trees marked by refuge personnel for roads or loading sites will be paid for at bid price.** Unmarked trees which are cut or injured through carelessness shall be paid for at **double** the stumpage price bid in the contract.
6. No loading sites will be permitted within 300 feet of public roads. A refuge forester must approve the location of all loading sites and temporary roads.
7. Trees will be limbed and topped where they fall.
8. Trees and tops cut shall not be left hanging or supported by any other living or dead tree or brush. Any tree that becomes lodged when cut shall be immediately rendered unlodged and felled flush to the ground. All tree tops and other logging debris will be removed from roads, roadside ditches, trails, firebreaks, fields, streams, and drainages immediately after felling. All tree tops felled within a designated zone along any improved road (see attached map) will be lopped and scattered to lie within two feet of the ground.
9. Vehicles and other equipment will be operated in a safe manner at all times. Both the refuge personnel and the visiting public also use refuge and public roads.
10. N/A

11. N/A
12. N/A
13. The permittee and his employees will do all in their power to prevent and suppress forest fires. Permittee shall be liable for all fire suppression cost resulting from his/her operations.
14. The Refuge Manager or his/her designee, i.e. Administrative Forester shall have the authority to stop timber harvesting operations anytime justifiable reasons develop.
15. The normal operating season on this sale will be June 1 through November 15. Any operations outside the normal season must be approved in advance by the Refuge Forester. For safety reasons and to minimize conflict, the permittee will cease logging operations during refuge deer muzzleloader and gun hunting seasons.
16. A pre-entry conference between the Refuge Forester (or designee) and the Permittee (successors or assigns) and logging contractor representative will be required before beginning logging operations to insure understanding of the permit conditions and thus avoid serious conflicts.
17. Doyle scale is used to estimate all hardwood sawtimber and pine sawtimber volumes. Tonage conversion factors: pine sawtimber 8 tons/MBF Doyle, pine pulpwood 2.6 tons/cord, and hardwood pulpwood 3.0 tons/cord.
18. Maintenance of all roads on Pond Creek used in the logging operation will be the responsibility of the permittee. To access the sale you will have to traverse miles of gravel roads and refurbish miles of wood roads. These roads must be maintained to pre-harvest condition.

General constraints and specifications for haul route improvement are as follows:

Use old travelways as much as possible to minimize stump and rootwad removal and refilling.

Maintain a maximum 20-foot wide road bed.

Crown the road to 6 inches by pulling shallow "V" ditches where necessary.

Place "B" stone in drainages to facilitate crossing but at a level that will not impede water flow.

Place pit-run gravel as necessary to firm up the road bed and in conjunction with culvert placement.

If necessary, disc and grade to fill in ruts after completion of the sale or by November 15 of each year - whichever comes first.

Grade all access roads as necessary to maintain a reasonably smooth road surface.

19. Should previously unrecorded cultural resources or human remains be discovered on Service land, construction or harvest activities will be halted immediately at that location. The Regional Archaeologist and the Refuge Manager are to be contacted at once.

20. The permittee shall protect all known and identified archeological sites against disturbance, destruction, or damage during harvesting operations. If, during the course of the harvest activity, the permittee notices illegal excavation or archaeological resource removal activities, this information shall be immediately provided to the Refuge Manager.
21. If, during the course of the harvest activity, the permittee deliberately damages a recorded site, the permittee will be responsible for the resultant site damage assessment and mitigation.

NATIONAL WILDLIFE REFUGE TIMBER SALE

FORMAL BID INVITATION

Sale Number P-X-YR

Compartment

Product Multiple

Formal sealed bids will be received in the office of the Refuge Manager of Pond Creek National Wildlife Refuge (NWR), Lockesburg, Arkansas, until 1:00 P.M., Month/Day/Year for the sale of quality loblolly and shortleaf pine sawtimber, pine pulpwood and hardwood pulpwood contained in marked trees in Compartment X Of the Pond Creek NWR, Arkansas, located in Sevier County, AR., southwest of DeQueen, AR., The compartment is south of ? Road, north and south of the pipeline, east of ? Creek and north of the ? River. The sale area is in Sections: and Township South, Range West.

All bids must be securely sealed in a suitable envelope and plainly marked "Timber Bid, P-X-YR;C. ?" on the outside of the envelope.

The sale material is located on approximately acres. This material consists of quality loblolly and shortleaf pine sawtimber, pine pulpwood and hardwood pulpwood marked at eye level and at the stump with blue paint. Only a portion of the sale area is presently marked. The remaining area will be marked as the timber harvest progresses to avoid as much remarking as possible due to high water obliteration of paint marks on the trees. Volume estimated to be removed is approximately board feet of pine sawtimber, cords of pine pulpwood and cords of hardwood pulpwood. No volumes are guaranteed. The bidder is responsible for determining volumes from which to base his/her bid.

A show me trip will be conducted by staff on . The staff and potential bidders will meet at at A.M. and then travel to the sale. The sale location is shown on the attached map. Additional information may be obtained at the Refuge Office. An ATV can be used to examine the sale area after receiving permission from the Pond Creek NWR office (870-289-2126).

Operations must be completed in the most expeditious time frame possible. The sale will expire on Month, Date, Year.

Each bidder will submit with his/her bid, a bid guarantee in the amount of \$500.00 payable to the U.S. FISH AND WILDLIFE SERVICE IN THE FORM OF A DRAFT OR CERTIFIED CHECK. The deposits of the unsuccessful bidders will be returned after a determination has been made regarding the bidder who will be awarded the permit.

The bid guarantee of the successful bidder will be retained by the Government and applied to the

Appendix F cont.

PERFORMANCE GUARANTEE which will be calculated at ten percent (10%) of the total value of the sale based on the estimated volume as shown in the bid invitation and the per unit bid of the successful bidder to cover any damages or claims the Government may have against the permittee as a result of this operation under the terms and conditions of the permit-agreement.

Payment of the performance guarantee will be in the form of a BANK DRAFT, CERTIFIED CHECK, or IRREVOCABLE LETTER OF CREDIT due within ten (10) days of purchaser's receipt of the timber sale permit. Upon satisfactory completion of the timber operation, the performance guarantee will be returned.

TIMBER MUST BE PAID FOR IN ADVANCE OF CUTTING. The successful permittee shall remit a bank draft or certified check for initial advance payment payable to the U.S. Fish and Wildlife Service. The above advanced payment will be determined by the value of the timber that the successful bidder *can harvest in a two-week period. (If the performance guarantee is of sufficient amount, a portion of that amount may be delineated as the initial advanced payment.)* Timber will be paid for every two weeks by bank draft or company check. The value of the timber will be based on actual scale tickets provided with the payment. Weather and logging conditions permitting, START HARVEST OPERATIONS WITHIN THIRTY (30) DAYS of the bid opening.

A copy of applicable special harvesting conditions and map is attached to this bid invitation.

A sample copy of the permit agreement is available from the refuge manager at the above address. The right to reject any or all bids hereunder is reserved.

Item 1: Pine Sawtimber \$_____ per ton.

Item 2: Pine Pulpwood \$_____ per ton.

Item 3: Hardwood Pulpwood \$_____ per ton.

Lump Sum Total for sale \$_____. For sale number P-X-YR; C.?.

Name of Bidder

Submitted by

Address

Signature

City, State, Zip

Date

OF-17 (NOV. 60)

FPR (41CFR) 1-16.805

IMPORTANT — NOTICE TO BIDDER

On the envelope submitting your bid, it is imperative:

1. That your name and address appear in the UPPER left corner.
2. That the bottom portion of this label be filled in and pasted on the LOWER left corner.

5017-102

S E A L E D	INVITATION NO.	B I D
	DATE OF OPENING	
	TIME OF OPENING A. M. P. M.	
	BID FOR	

Glossary

Glossary

Aesthetics	Of or pertaining to the sense of beauty.
Acquisition boundary	Perimeter around existing property boundary that is under consideration for acquirement.
Arkansas Birds of Conservation Interest (ABCI)	List of birds considered by 'Arkansas Audubon' as a species of concern due to continued downward trends in population and/or continued loss of habitat.
Avifauna	The birds of a region.
Basal area	The cross-sectional area (in square feet at breast height) of all trees on a per acre basis.
Buffer zones	A strip of varying size and shape preserving or enhancing aesthetic values along roads, trails or water.
Compatible use	A wildlife-dependent recreational use or any other use on a refuge that, in the sound judgement of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.
Connectivity	Forested stands with only minor breaks caused by relatively narrow roads and water bodies.
Emergent super-dominant	A tree that is a minimum of 20 percent taller than co-dominant stems in the surrounding stand.
Ground cover	Forest stand vegetation less than three feet in height.
Habitat corridors	Narrow passages of similar vegetation between larger areas of habitat.
Horizontal stand structure	The structural change in condition of a forest stand on a horizontal plane.
Internal stand structure	Forest floor vegetation, understory, mid-story, and overstory that make up a stand community.

Mid-story	Forest vegetation usually greater than ten feet and consisting of overtopped and intermediate trees and vegetation below the overstory.
Off -site pine plantations	Systematic planting of a monoculture species that is in appropriate usually due to species/site incompatibility.
Overstory	Forest vegetation above the mid-story consisting of dominant and co-dominant trees and vegetation.
Patchiness	Typically measured in terms of spatial relationships between reproduction clumps or shrub clumps, comprised of early successional stage plants such as vines and herbaceous growth, to closed canopy/more open stand conditions.
Pond Creek Comprehensive Conservation Plan	A document that describes the desired future conditions of the refuge, and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the system, and to meet other relevant mandates.
Preferred alternative	The Service's selected alternative identified in the Pond Creek NWR Habitat Management Plan.
Remnant habitats	Several small areas of late seral stage communities that are found scattered throughout the refuge and exist probably due to inaccessibility, such as being surrounded by drainage systems.
Riverine wetlands	Occur along streams and rivers and in floodplains that are flooded periodically but can be dry during parts of the year. <i>Ex.</i> Formed where coarse sediments deposited by floods impound a stream.
Rotation age	The planned number of years between the formation of a stand and its final cutting at a specified stage of maturity.
Silvicultural practices	The art and science of controlling forest establishment, composition, structure and growth.

Understory

A horizontal layer of forest vegetation usually between three to ten feet of the ground.

Uneven-aged communities

Three or more age classes of tree species within the same locality.

Vertical stand structure

The condition of a forest stand viewed vertically.